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JPRS Report

Nuclear Developments

Nuclear Developments

JPRS-TND-89-020

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SOUTH AFRICA

Group To Meet U.S., USSR, UK on Nuclear Pact

*MB2709113989 Johannesburg Domestic Service
in English 1100 GMT 27 Sep 89*

[Text] South Africa is to hold diplomatic talks with the Soviet Union, the United States, and Britain soon about the possible signing of a nuclear nonproliferation treaty.

The Department of Foreign Affairs confirmed in Pretoria a short while ago that a South African delegation would attend a meeting of the International Atomic Energy Board overseas later this year.

Preliminary talks on the signing by South Africa of the 1969 nuclear nonproliferation treaty will be held then.

Until now, South Africa has refused to sign the treaty. Our political staff says that South Africa has also until now refused to allow its nuclear plants to be investigated by certain of the 140 member countries.

Lop Nur Nuclear Testing Facility Profiled*HK1710005789 Beijing ZHONGGUO XINWEN SHE
in Chinese 1216 GMT 11 Oct 89*

[Special feature by reporter Zhu Daqiang (2612 1129 1730): "Exploring the Secret of the 'Atomic City'"]

[Text] Urumqi, 11 Oct (ZHONGGUO XINWEN SHE)—As the atom bomb undertaking of China is entering its "adulthood," this reporter was lucky enough to cover news at the Lop Nur nuclear testing base, which is situated in western China, and to look back on the brilliant development course of China's nuclear weapons.

At Malan, a nuclear testing ground, a builder of around 60 years old briefed us on how the Chinese authorities came to the policy decision of developing nuclear weapons.

Just as China started its atomic energy undertaking, it encountered a technological blockade by foreign countries. In June 1959, big country stopped technical aid to China. In order to arouse the nationalistic spirit, China's first atom bomb was named the "June 59" mission.

On 15 August 1958, a small special train from Henan's Shangqiu, carrying a prospecting team of 120 military personnel and various equipment, pulled up at Xiadong station near Dunhuang and starting the prospecting work in the nuclear testing field. At that time, those carrying out the mission were told "not to disclose it to their parents, nor pass it down to their children."

The nuclear testing field was originally fixed at a place near Dunhuang. However, after repeated prospecting, it was believed that it would not be good for the protection of the cultural and art treasures in Dunhuang. Besides, the geographic location and other conditions there were not suited for fairly large nuclear tests.

Therefore, the prospecting team went further west. The natural field of Lop Nur revealed itself to them. This vast land has only very few people and its climate is mild. With a total area of over 100,000 square km, it is larger than Zhejiang Province. China's first nuclear commander, Zhang Yunyu, said in retrospect: "All over the desert we have looked for the precious land. This is the best testing field."

In June 1959 the Ministry of National Defense approved Lop Nur as a nuclear testing base for China. Five years later—or rather, on 16 October 1964—a dazzling light flashed over Lop Nur, followed by an earth-shaking rumbling and a gigantic fireball spiraling up like a mushroom cloud....

Since then, China has entered the atomic age.

Today, in the center of the site where the first atom bomb exploded, we can still see the remains of colossal iron towers lying twisted on the ground like noodles and surrounded by scorched earth.

There stood a stone tablet engraved in a bold hand with the following words: "China's first nuclear test explosion center." That is General Zhang Aiping's handwriting.

A little iron plaque by the stone tablet aroused our curiosity. It reads: "As measured on 6 July 1979, the ground dose rate is 4 milliroentgen per hour." As professional people explained, this means that it is safe to visit here.

At the Lop Nur testing field, there is also a target section in which nuclear weapons have been dropped more than a dozen times. The glass-like ground is vivid before our eyes. The "permanently polluted areas" where underground nuclear tests have been conducted still make you step back in fear.

Up to the present, China has conducted more than 30 tests of various kinds and equivalents, such as explosions from a tower, in the air, in an underground tunnel, and in a standing well and has attained a level which would require several hundred tests for other countries, thus establishing China as a nuclear power. An atomic city—Malan nuclear testing base, stands in the depths of the Taklimakan Desert. This is the living area of the nuclear test unit.

When the prospectors came to this desolate desert for the first time, there were only several families in the boundless stretch of desert. Malan flowers were blooming on both sides of a brook and thus Commander Zhang Yunyu called the living area of the base "Malan."

Thirty years have elapsed. The people of Malan have built with their own hands a "city" with an initial scope of development.

When you are strolling on the streets of the "atomic city," you are surrounded by tall white poplar trees and beautiful flowers and plants, which make the city full of life. You will never feel that you are in the Gobi Desert.

An independent "small community of military personnel" has been established here. Streets and apartments are in apple pie order, with the work area and the living area lying side by side. There are banks, post and telecommunications offices, food stores, schools, kindergartens, hospitals, department stores, photo studios, and ballrooms. In addition, the "Loudian television station" has been built here.

In the work area, there are institutes for the study of fluid mechanics, solid mechanics, optics, physics, radiochemistry, and computers. Here, the military personnel of an intellectual sort quietly devote their youth and wisdom to national defense and the frontiers.

Malan, a bright pearl in the desert of southern Xinjiang, has a strong appeal to the youth of different nationalities in the border area. When Malan flowers blossom, it is an exceptionally good time for people in love to have their weddings....

Article Reviews Peaceful Uses of Nuclear Energy

OW1610211189 Beijing BEIJING REVIEW in English
No 42, 16-22 Oct 89 pp 17-24

[Article by China Nuclear Industry Corporation: "Peaceful Use of Nuclear Energy"]

[Text] The founding and development of the nuclear industry is one of the greatest achievements in China's socialist construction since the founding of the People's Republic 40 years ago. China's successful development of atom and hydrogen bombs and the power facilities for nuclear submarines in the 1960's shocked the whole world at the time. In the following years, particularly since the 1980's while modernizing its national defence, China has attached importance to expanding the civilian use of nuclear technology, endeavours in which the country is world renown.

Development

To break the nuclear monopoly of a few countries and fortify its national defence, the Chinese Government decided to develop its own nuclear industry in the early 1950's. Despite the international blockade and embargo, China has, by self-reliance and after protracted struggle, developed its nuclear industry, from scratch and became one of the few countries possessing both nuclear weapons and a fairly complete nuclear industry.

Noted Chinese physicists, including Wu Youxun, Qian Sanqiang, Wang Ganchang, Peng Huanwu and He Zehui, all made contributions to the founding of China's first nuclear research institute and the development of the country's nuclear technology. Later achievements attest to their rank among the world's best scientists.

Cherishing their native land, many Chinese scientists who resided abroad gave up a comfortable life and pleasant working conditions and returned to China to participate in the founding of the country's nuclear industry after breaking through numerous obstacles. They include theoretical chemist Guo Tingzhang, theoretical physicists Deng Jiaxian and Quan Xingnan, experimental physicists Yang Chengzhong and Chen Yiai, high energy physicist Zhang Wenyu, radiochemists Yang Chengzong, Xiao Lun and Feng Xizhang, accelerator expert Xie Jialin, and computer and vacuum apparatus expert Fan Xinbi. They brought back technology and equipment badly needed by New China. Nuclear physicist Zhao Zhongyao brought home a number of electrostatic accelerator parts and equipment required for a nuclear physics laboratory after overcoming the objections of the Federal Bureau of Investigation of the United States.

Some other noted specialists, including Jiang Shengjia, Zhu Guangya, Yu Min, Zhang Peilin, Guo Yonghuai, Wu Zhengkai and Zhou Guangzhao, later joined them to become the pioneers and the foundation of various fields of China's nuclear technology and industry. Under their

guidance, many young scientists and technicians developed quickly, and a strong contingent of China's nuclear scientific and technical workers took shape.

In the mid-1950's, China's nuclear research made significant headway. Large uranium reserves were discovered and, of special importance, the rapid development of the country's basic industry provided the basic conditions for the establishment of the nuclear industry and enabled it to advance from theoretical study to practical production.

In the late 1950's and early 1960's, China nuclear industry operated under an agreement of co-operation with the Soviet Union until the unilateral suspension of the agreement by the Soviet side.

Given this geo-political environment, China had to be self-reliant to overcome numerous difficulties in the development of its own nuclear industry. The government, though, has attached great importance to the nuclear industry even in its embryonic stage. A 15-person special committee headed by Premier Zhou Enlai and consisting of Vice Premiers He Long, Li Fuchun, Bo Yibo, Lu Dingyi, Nie Rongzhen and Luo Ruiqing, and other government officials was founded in 1962 to guide the work of the nuclear industry and other industries involving advanced science and technology. Premier Zhou Enlai personally participated in the planning, implementation and management of the industry buildup.

After many years of efforts, China finally succeeded in exploding its first atom bomb on October 16, 1964, a historical breakthrough resulting in worldwide repercussions. Thirty-two months later, China successfully exploded its own hydrogen bomb. China made the achievement in a much shorter time than was required by other nuclear countries after the development of their atom bombs. For instance, it took the United States seven years and four months; the Soviet Union, four years; Great Britain, four years and seven months; and France, eight years and six months. In September 1971, China again successfully developed the power facilities for nuclear submarines.

With the changes in the international and domestic situation, China has introduced economic structural reform and the open policy since 1979 and stressed to put economic construction at the first place, with the modernization of industry, agriculture, science and technology, and national defence as its focus. The nuclear industry has subsequently readjusted its development strategy, shifting the focus from national defence to economic construction. The policy of combining military with civilian use, combining scientific research with people's lives, and combining civilian technology with industrial production and trade was then formulated. This realignment ushered in a new stage for the peaceful use of nuclear technology.

Since 1979, China's nuclear industry has become more civilian oriented. Currently, it has more than 1,000 uses,

including power generation, nucleon instruments, radio-isotope, machinery, universal electronic instruments, special motor vehicles, fire alarming products, light industrial products, metallurgical and chemical products and building materials. In 1985, the output value of the industry's civilian products made up 33.7 percent of its total output value.

In the civilian project, nuclear power, nuclear fuel circulation, isotope and radiation industries, as well as related high-tech concerns have kept pace with the overall growth of the nuclear industry and attained remarkable achievements.

Nuclear Power Station

In recent years the shortage of energy resources has become an important factor in limiting China's economic development. Since nuclear power has been publicly acknowledged as economical, clean and technically advanced, as well as the most important symbol of the peaceful use of nuclear energy and its technology, the Chinese Government has placed priority on its development.

In regard to the construction of its nuclear power stations, China adheres to the principle of mainly relying on its own forces in the pursuit of Sino-foreign cooperation and importing and absorbing advanced foreign technology to support China's own study, design and construction.

The Qinshan Nuclear Power Station in Haiyan County, Zhejiang Province, is the first nuclear power station designed and built entirely by China. Equipped with a technologically sophisticated pressurized water reactor, the first stage of the project consists of 170 systems and has an installed capacity of 300,000 kw. The State Nuclear Security Bureau, founded immediately after the project's initial design, is responsible for ensuring adequate safety and environmental protection. Construction of the project formally began in March 1985 and, to date, several pieces of major equipment, including the containment, turbogenerators, the evaporator and pressurizer, have been installed. Related supplementary projects and the preparatory work for trial-operation are under way. The project is scheduled to be completed and begin generating by the end of 1990. Two inspections were made by an inspection team of the Ministry of Energy Resources, the Nuclear Power Office of the State Council and the China Nuclear Industry Corp., and the safety appraisal group of the International Atomic Energy Agency (IAEA), which confirmed the progress and the quality of the project. In addition to generating power, the Qinshan Nuclear Power Station, the first of its kind in China's mainland, will provide a fund of material for the study, design, construction, operation and the manufacturing of necessary equipment. According to plan, the preparatory work for the second stage of the Qinshan project—a double-reactor project equipped with two 600,000-kw generators—is now under way. Currently, it is seeking co-operation with

foreign counterparts in design, equipment manufacturing and construction while striving to increase the proportion of Chinese-made equipment and produce a series of standard 600,000-kw generators for China's nuclear power stations.

The Daya Bay Nuclear Power Station in Guangdong Province, China's second nuclear power station now under construction, is also China's largest Sino-foreign co-operative project. The project has proceeded smoothly since construction began in August 1987. With a total installed capacity of 1.8 million kw, the station will be able to generate 10 billion kwh of electricity annually. Two 900,000-kw generators are scheduled to begin operation in 1992 and 1993 respectively, with 70 percent of the electricity going to Hong Kong and the remainder 30 percent to Guangdong.

According to China's intermediate energy development plan, by the year 2000, 12.5 million-kw nuclear power stations will be under construction and 6 million kw will be completed. After the year 2000, nuclear power will enter a period of further large-scale construction.

Uranium Resources

To accomplish its strategic target for nuclear power development, China has been striving to establish a channel for the sustained and stable supply of uranium resources and nuclear fuel. China's verified uranium resources indicate that it has a sufficient supply and uranium ore prospecting has been going on since 1955 in 25 provinces and autonomous regions. More than a dozen kinds of ore beds have been verified and a considerable supply made available to industrial departments. Analysis made by Chinese and foreign experts indicates that the potential of China's uranium resources can fully meet the medium- and long-term development of China's nuclear power stations.

To facilitate the development of nuclear power, China is in the process of establishing a complete, advanced nuclear fuel recycling system. Efforts are currently under way to develop production lines for fuel elements, a pilot plant for processing spent fuel element and the uranium-isotope separation technology. Today, China's uranium products have entered the world market and the country has also made important progress in the centrifugal and laser separation of uranium and isotope.

Isotope and Nuclear Radiation

Currently, China is trying to commercialize the isotope and radiation technology for application in the national economy and people's daily life.

The development of isotope and radiation technology began in the early period of China's nuclear industry. After more than 30 years of study, application and development, an industrial system has taken initial shape with some items produced of international quality. The country can supply nearly all of its requirement for isotopes and isotope products. At present, there

are more than 100 units and 20,000 professionals engaged in isotope-related work in industry, agriculture, medicine, natural resources, environmental protection, scientific research, education and the ordnance industry. With an average annual growth rate in output value between 10 and 15 percent, the industry can now turn out more than 800 kinds of products to serve 2,000 clients. The industry involves isotope and its products, nuclear instruments and meters, accelerators, radiation processing, nuclear agriculture and nuclear medicine. Particularly marked achievements have been attained in agriculture where radiation technology has been applied to breed improved seeds. So far, 285 improved seeds of grain, cotton, oil-bearing crops, vegetables, fruit trees, flowers and plants have been widely used in the country. Accounting for one-third of the world's total radiation-bred seeds, they are now sown to 8.67 hectares of land and able to yield 5 billion yuan in profit. In addition, good results have also been achieved in the neutron-induced antibiotic vaccine, the radiation breeding of silkworms, the sterile-insect technique by irradiation, the isotope tracing technology applied in plant cultivation and fertilizer application, diagnosing animal diseases and the production of vaccines. These developments have, overall, resulted in enormous economic returns.

Isotope and radiation technology is also widely used in the diagnosis and treatment of human diseases, making great contributions to modern medical science. More than 1,000 medical units use 60 isotope medicines and 100 diagnostic methods to treat more than 20 million people each year. Isotope technology has already become an indispensable means in the diagnosis and treatment of many types of cancer, hepatitis B, and thyroid gland, coronary, skin, internal system and reproductive organ diseases and in the study of immunology and molecular biology. The research conducted jointly by the Acupuncture and Moxibustion Institute of the Chinese Academy of Traditional Chinese Medicine and the Nuclear Medicine Department of the General Hospital of the People's Liberation Army on using the nuclear tracing technology to display the operation of vital energy circulating passages has passed the review by experts and its success has made a new breakthrough in the study of vital energy circulating passages, an important branch of traditional Chinese medicine.

China now has 1,100 scatter scanning machines, 1,800 multipurpose analyzers, 1,100 calculating equipment for medical use, 62 gamma ray cameras and 11 isotope fault video picture equipment. Progress also has been made in the use of the radiation technology, for use in the sterilization of medical articles, radiation chemical industry and foodstuff preservation. A considerable production level has been formed in the radiation sterilization of injectors, syringe needles, blood transfusion and infusion bags and dressing, the radiation of high-molecular heat contracting materials, electric wires and cables, and the radiation preservation of foodstuffs. Radiation chemical products have already been applied to the astronautical industry, submarines, telecommunication services and electrical appliances.

The returns from its application in industry are even more impressive. Improving the features of solid materials by the technology of irradiation, nuclear logging meter, nuclear non-destructive assay and nuclear analysis, as well as isotope and irradiation instruments and meters have been widely used in machine-building, building materials, metallurgy, textiles, printing, paper-making, petroleum, chemical and light industries. Isotope and radiation technology, being used more and more to benefit the society and people in China, has a great potential and particularly broad prospects in the application in industry.

Non-Nuclear High-Technology

Accompanying the construction and development of China's nuclear industry over the past 30 and more years, some related non-nuclear technology of unique characteristics have mushroomed, and brought along a great deal of scientific and technical results with commercial potential. Some already have acquired the foundation for standard study, development and production. The production of radiation-, heat- and corrosion-resisting materials, superconductors and other special materials needed in the development of nuclear high-technology has spun off the production of all kinds of new materials. Moreover, the wide application of the technologies of nuclear analysis such as activation analysis, fluorescence analysis, nuclear magnetic resonance, back scattering channeling analysis, have provided industry, agriculture, medicine, bio-engineering, public security, astronomy, archaeology, and other fields with the means of research which before had been unavailable.

During the course of the development of the nuclear technology, related advanced technologies, such as the membrane separation and the hydrometallurgical technology, were developed.

New Achievements

A number of large experimental devices designed and manufactured by China's own forces have been completed and put into operation in recent years. Other projects which have been completed include high-flux test reactors, micro-reactors, and HL-1 Tokamak equipment. Efforts have been made to improve heavy-water reactors and to construct a number of nuclear power plants completely designed by China. Significant progress has also been made in the centrifugal isotope separation technology, and the study of advanced reactors, fast neutron reactors and low temperature nuclear heat reactors has been proceeding step by step. All this has opened new vistas for the more effective use of nuclear energy.

At present, China has a complete scientific and technological nuclear research system and a contingent of scientists of high technical level, strong vocational skills

and the ability to work cooperatively. There are comprehensive scientific research institutions involved in multi-branch studies of uranium ore geology, uranium ore mining, isotope separation, elements production, post-treatment, the disposal of waste gas, waste water and industrial residue, nuclear physics, controlled thermonuclear fusion, laser, nuclear chemicals, reactors, nuclear power stations, isotope production, nuclear technology, radiation protection, radiation medicine, accelerators, nuclear equipment, organic and rare chemical element industries, and other civilian projects. Currently, China has more than 20 research and design institutions engaged in the study and development of nuclear science and related high-technology. The important scientific research and engineering projects completed by these institutions include the Qinshan Nuclear Power Station, strong current pulse electron beam accelerators, and neodymium glass laser devices, the importance of which has been recognized by IAEA and many foreign countries. By the end of 1988, China's nuclear industry system could claim 5,000 noted accomplishments to its name.

Sino-Foreign Cooperation

Since 1980, China's nuclear industry has extricated itself from the closed-door state, gradually opened its door to the outside world and developed international cooperation and foreign trade. In 1984, China joined IAEA and was appointed a permanent member state. Since then, it has actively and widely developed international cooperation and foreign trade in the peaceful use of nuclear energy and technology. It has signed bilateral cooperation agreements or letters of intent on the peaceful use of nuclear energy with government representatives and non-governmental organizations of 13 countries, including Italy, France, the Federal Republic of Germany, Japan, and the United States. It has established various kinds of relations with 40 other countries and regions and has trade relations with more than 100 clients, promoting China's scientific and technical exchanges with the world. Today, Chinese nuclear industry's cooperation has already expanded from the prospecting and exploitation of uranium resources, the construction of nuclear power stations and the treatment of radiated wastes to the import and export of uranium products for peaceful use and the trade in metallic and non-metallic ores and products, artificial diamond and products, mining equipment and meters. In addition, it has undertaken feasibility studies, design and construction of a considerable number of public facilities and civil architectural projects for foreign countries, provided labour service and contracted projects abroad. The output of some Sino-foreign joint ventures has been equal to advanced international level.

In the future, the implementation of China's export-oriented economic development strategy, the development of high-technology, the technological transformation of traditional industry and agriculture, the sustained and stable supply of energy resources and the upgrading of technology in all economic departments will all call

for a still more rapid development of the nuclear industry, an important component part of China's modernization drive.

The China Nuclear Industrial Corp. has set a development strategy of giving priority to nuclear power and, at the same time, developing diversified management and international cooperation. Efforts will be devoted to strengthening nuclear power construction, nuclear fuel production, uranium ore prospecting, the wide application of nuclear technology, nuclear science study, and the development of high-quality and high-output products for civil use, and export-oriented, foreign exchange-earning products. The goal is to turn the nuclear industry into an even better managed, creative industry.

Radio Program Reviews Nuclear Development

*OW2809001189 Beijing International Service
in Mandarin 0900 GMT 15 Sep 89*

[From the "Commemorating the 40th Founding Anniversary of New China" program]

[Excerpts] Dear listeners, how are you? In today's program "Commemorating the 40th Founding Anniversary of New China," I will describe the establishment and development of nuclear science and technology in China.

China started with a very poor and backward foundation in developing its national economy through self-reliance, and has made great achievements in the past 40 years, including achievements in the nuclear industry.

Starting from scratch, China's nuclear industry has made rapid progress and achievements known around the world. China is one of the few countries in the world that possesses nuclear weapons and a fairly complete system of nuclear science, technology and industry. [passage omitted]

In 1978, China began to implement the policy of reform and opening, which ushered in the new period of socialist modernization. Important readjustments were also made in the development of the nuclear industry in China. In the past, the nuclear industry was primarily oriented toward the military; now, it has shifted its emphasis to serving the national economy. In this connection, the primary concern is the development of China's nuclear power.

This reporter learned from (Li Yingxiang), press spokesman of the General Office of China Nuclear Industry Corporation, that two nuclear power plants are now under construction. The first-stage project of the Qinshan 300,000-kilowatt generating sets, designed and built by China itself, will be completed and begin generating power by the end of 1990. The Dayawan Nuclear Power Station in Guangdong is a joint venture that imports complete sets of foreign technology and equipment. According to contract, it will be completed in stages and begin generating power between 1992 and 1993.

(Li Yingxiang) said: Other projects approved by the State Council include the second-stage project of the Qinshan Nuclear Power Station and nuclear power facilities in Liaoning and other provinces and municipalities in northeast China. According to expectations, China will have built some 6 million kw of nuclear power projects by the year 2000. Projects for the remaining 6 million kw will be built one after another.

Another important field of application of China's nuclear science and technology in the national economy is the development and utilization of isotope and irradiation technology to serve industry, agriculture, medicine, and other occupations.

(Li Yingxiang) said: After more than 30 years of hard work, China managed to increase the varieties of isotope products from 33 kinds in 1985 to more than 800 kinds in 1988, making China basically self-sufficient in this aspect.

He said: Now China is at the advanced level in the world in terms of acreage of crops bred by irradiation technology, and the resulting economic benefits. As of 1988, a survey on a single index of irradiative crop breeding alone showed that China had developed an accumulated total of more than 240 varieties of crops, accounting for one-third of the world's varieties of crops bred by irradiation technology. [passage omitted]

Application of nuclear science and technology in other fields of studies invariably generates new disciplines. Nuclear medicine, which combines nuclear science and technology with medicine, has developed following the development of nuclear science, technology, and industry in China. According to incomplete statistics, more than 900 medical units in China are now applying more than 100 isotope therapeutic methods in clinical operations, including external radiation and internal chemical radiation treatments. Working personnel in nuclear medicine number only 4,000, while some 10 million patients are receiving isotope and radiation diagnoses and treatments each year. [passage omitted]

Broadening international exchanges and cooperation is an important way to promote scientific and technological development. Nuclear science and technology has a particularly distinctive feature in international exchanges.

In 1984 China formally joined the International Atomic Energy Agency [IAEA] and became a designated council member. China has signed separate agreements or protocols on peaceful use of atomic energy with the relevant departments or governments of Italy, France, Britain, West Germany, Belgium, and a dozen or so other countries.

In 1985 China became a signatory of the Asian-Pacific Regional Cooperation Agreement on Nuclear Science and Technology Research, Development and Training, one of the regional cooperation programs of the IAEA. In that year, for the first time, China cooperated with this

organization and held, in China, two international training classes for senior personnel, attended by members from 16 developing countries.

All this shows that China, while applying nuclear science and technology in developing the national economy, has begun to contribute its share to international programs on peaceful use of nuclear energy.

Agriculture Taps Nuclear Technology

*OW2109195389 Beijing XINHUA in English
1455 GMT 21 Sep 89*

[Text] Hangzhou, September 21 (XINHUA)—China has made great achievements in applying nuclear technology to agricultural development over the past 30 years.

Application of nuclear technology to agricultural development has become a new science in China. Nuclear radiation breeding in China [words indistinct] the world, said Professor Chen Ziyuan, chairman of the Chinese Society for Application of Atomic Energy in Agronomy and president of the Zhejiang Agricultural University.

He made the remarks in Hangzhou at a recent symposium at which 38 young scientists from 20 provinces and cities presented 46 papers on their research in applying atomic energy in agronomy. The symposium was the first aimed at promoting exchanges between young scientists.

The science of applying atomic energy in agronomy began in China in the 1950s. Chen said that as of the end of 1988, Chinese scientists had developed 285 varieties of new strains of 23 crops and plants on 14 million hectares of land by utilizing nuclear radiation combined with other methods. That has increased grain output by 3.5 million tons and produced profits of 5 billion yuan (rmb).

Among the new breeds developed by radiation, "yuan-fengzhao" rice, "No 1 lumian" cotton and "tiefeng-18" soil beans have been awarded national first class medals for invention.

The research work has also provided a large amount of valuable genetic materials with early ripening, short stock, disease resistance and other characteristics, said Chen.

He said the methods, technologies and mechanism and genetic application of radiation-guide breeding as well as application of isotope technologies to chemical elements have also made progress.

Radiation has also been used in stimulating growth, prevention and elimination of diseases, product storage and maintaining freshness. Isotope research has been carried out in developing fertilizer, radiation ecology and environmental protection.

According to Professor Chen, the Chinese Society for Application of Atomic Energy in Agronomy, which has

branches in 21 provinces, municipalities and autonomous regions, was founded in March 1979. Now China has 140 departments and about 2,000 people engaged in this research.

The country has more than 60 agricultural cobalt resource stations and several neutron generators and electronic accelerators for research and education in the science.

UN Efforts Against Atomic Radiation Supported
OW1710194689 Beijing XINHUA in English
1645 GMT 17 Oct 89

[Text] United Nations, October 17 (XINHUA)—China supports all U.N. activities and efforts to protect human health and safety from the effects of atomic radiation and will take an active part in some of these activities, Liu Zhaodong, a Chinese representative, said here today.

Speaking at the special political committee which began to consider the question of the effects of atomic radiation this morning, Liu environment and healthy existence of humanity and should therefore attract greater attention from all countries and the relevant U.N. organization [sentence as received].

China, which has been devoting itself to developing its national economy and improving the people's living standards, has adopted a basic economic and technical policy to go in for peaceful utilization of nuclear energy on the basis of ensured safety, Liu declared.

He also stressed the importance of providing disseminating data and information about the effects of atomic radiation in a timely fashion to the U.N. member states, especially the developing countries.

According to some related U.N. documents, a large number of radiation sources has been used for industrial and other purposes. At the end of 1987, for example, there were 417 reactors operating in 26 countries, with six notable reactor accidents having occurred since 1982. It is widely believed that the globe is at great risk of contamination by the radioactive wastes released during the nuclear fuel cycle and by nuclear accidents.

In view of the global concern about this problem, a U.N. scientific committee on the effects of atomic radiation was established in December 1955. Since then it has undertaken a lot of studies on radiation doses, such as doses from natural sources of radiation, doses of man-made sources of radiation in the environment and epidemiological study of radiation effects on human population.

A resolution, which was sponsored by 24 countries, including China, and adopted unanimously today, commends the scientific committee for its valuable contribution in the past 34 years to wider knowledge and understanding of the levels, effects and risks of atomic radiation.

The resolution calls upon the scientific committee to continue increasing knowledge of the levels, effects and risks of ionizing radiation from all sources. It also requests the U.N. environment program to continue providing support for the scientific committee's work and for the dissemination of its findings to the General Assembly, the scientific community and the public.

Seminar Examines Peaceful Uses of Atomic Energy

HK1010015089 Beijing CHINA DAILY in English
10 Oct 89 p 3

[By staff reporter Xie Liangjun]

[Text] The International Atomic Energy Agency (IAEA) provides China with more than \$500,000 in technological aid annually to help its development on the peaceful use of atomic energy. CHINA DAILY learned from the IAEA research, co-ordination and consultants' meeting on nuclear borehole logging yesterday in Beijing.

The meeting, which will end on Friday, has attracted 16 scientists and experts from Australia, Canada, Poland, India, Egypt, the Soviet Union, the United States, Vietnam and Hungary.

Sources from the China National Nuclear Corporation (CNNC) said China has received several million dollars in technological aid, involving about 20 projects, from the IAEA and United Nations Development Programme over the years.

At yesterday's opening ceremony, geologist Chen Zhaobo, executive vice-president of CNNC, said that nowadays, development of natural resources is a matter of the utmost concern throughout the world, adding that China has established a technical system for nuclear borehole logging which is used successfully in its petroleum, gas and uranium exploration and development.

"In developing and applying these techniques, Chinese experts have learned a lot from foreign colleagues," said Chen, expressing the hope that the meeting would provide a new opportunity for Chinese scientists and experts to learn and exchange experiences with foreign delegates.

In order to help other Third World countries to use atomic energy peacefully, China had made many contributions and accepts people from these countries to study and holds short-term training courses and seminars, as well as sending experts abroad to help.

China began research and development in this field in the 1950s. For more than 30 years, great progress has been made and now, about 40 to 50 per cent of geological data in oil exploration in China is sought by nuclear borehole logging.

However, much of this sophisticated technology has to be imported.

But associate professor Zhao Jingqi from the Division of Nuclear Applications under the China Institute of Atomic Energy said that Chinese experts are trying to find a way to produce such equipment.

Li Peng Congratulates Workers on Nuclear Reactor

*OW1710160789 Beijing XINHUA in English
1537 GMT 17 Oct 89*

[Text] Shenzhen, October 17 (XINHUA)—Chinese Premier Li Peng recently congratulated the construction workers at the Guangdong Nuclear Power Plant on the topping out of the No. 1 nuclear reactor.

With a total generating capacity of 1.8 million kw and a total investment of 4,000 million U.S. dollars, the plant is China's largest joint venture, with experts and workers from 18 countries and areas involved. The topping out of the No. 1 nuclear reactor September 21 marked the start of the installation.

Already, 70 percent of the construction work of the reactor and generating unit have been completed. Most of the equipment was manufactured in France and Britain, and 30 percent has been shipped to the construction site.

Under the principles of "safety first and top quality", the plant has multiple monitoring systems. Following examinations in January and July this year, the State Nuclear Safety Bureau is satisfied with the quality of the construction, equipment and installation.

Two groups of technicians and managers have been sent abroad for training.

Biographies Profile Leading Scientists

*OW1110120589 Beijing XINHUA in English
0802 GMT 11 Oct 89*

[Text] Beijing, October 11 (XINHUA)—A series of biographies of contemporary Chinese scientists were published here today.

Edited and published by the Chinese Association of Science and Technology, the first five biographies were about nuclear scientist Qian Sanqiang, geologist Li Siguang, gynecologist Lin Qiaozhi, agricultural scientist Ding Ying and mechanic engineer Shen Hong.

In a preface to the books, Marshal Nie Rongzhen, former Chinese leader of science and technology for national defense, praised the scientists' commitment to reinvigorating the Chinese nation.

JAPAN

Nuclear Fuel Planning System Developed

430630491 Tokyo *GENSHIRYOKU SANGYO SHIMBUN* in Japanese 1 Jun 89 p 5

[Text] Kansai Electric Power which is continuing to develop several types of expert systems (ES) for nuclear power generating plants, is planning soon to test operate a "System for Drafting Plans for Nuclear Fuel Related Operations" at its Fukui Atomic Energy Office.

Since 1985 Kansai Electric has been working regularly on research introducing AI to the atomic energy field.

There are many experts throughout the world who have given practical assistance at nuclear power plants maintaining first class safety standards and high operational efficiencies and the main purpose of these systems has been to successfully transfer their valuable experiences gained over long years to succeeding generations as these future generations take over. Furthermore, in light of nuclear accidents such as Three Mile Island, it is all the more important to systematically arrange and make effective use of the experiences and knowledge of experts in areas such as operation and maintenance under conditions which emphasize man-machine interface problems, human factor problems, etc.

For this reason it has become essential to push ahead with the research and development of artificial intelligence (AI) and ES techniques specifically. With this point of view, Kansai Electric has normalized AI research in the atomic energy field and up to the present time has worked in 17 subject areas.

From the standpoint of the efficient operation of entire nuclear plants, it is important to perform smoothly the transport of fuel to nuclear plants, its loading, and the series of operations from the removal of spent fuel to its reception in storage pits. In the transport of fuel, ongoing operational circumstances change with the method of transport such as land or sea and with choices involved with seasonal timing. In regard to the removal of spent fuel as well, a series of delicate operations is necessary for the treatment of burnable poison, etc.

For these reasons, appropriate operational management and the drafting of plans for delicate operations by experts with many years of experience and know-how in these operations is considered necessary for this work.

The system which will be test operated soon will assist in the drafting of appropriate operational plans by gathering this type of know-how and knowledge together. The system prototype will be completed by questioning on-site experts and in the future they plan to supplement and revise the knowledge gathered through test operation on actual work and ultimately to complete an ES with which even beginners can draft operational plans along side veterans.

In addition, for use in the training and education of operations personnel, they are continuing to develop a "Knowledge Acquisition Assistance System" which assists in the rapid understanding of plant conditions. It is a system which checks important data from information regarding changes in conditions in essential equipment (for example, flow rates, pressure, and temperature) and systematically comes to learn about phenomena which are predicted on the basis of their special characteristics.

At the present time the formation of a knowledge base is continuing.

Furthermore, development is proceeding steadily on: an "Accident/Damage Analysis Evaluation Assistance System" which in the event of trouble quickly indicates the location of the problem and important items for inspection, a "Guidance System for Operations During Accidents and Emergencies" which assists operations personnel by displaying appropriate management procedures in case unusual phenomena are seen, and a "System for Assisting in the Planning of System Isolation Operations" which assists in the drafting of plans for the isolation of systems such as complicated pumps and plumbing during inspection work.

In the future, Kansai Electric says that it has plans to build a company-wide information network (new computerization) incorporating these various ES.

Prosecutors Release Uranium Dealers

OW2209134689 Tokyo *KYODO* in English 1045 GMT 22 Sep 89

[Text] Tokyo, Sept. 22 *KYODO*—Seven suspects who were arrested in connection with an aborted attempt to sell four kilograms of uranium to the U.S. Embassy in Tokyo for 12 billion yen were released Friday afternoon, the Tokyo public prosecutor's office said.

The seven were arrested early September by the Metropolitan Police Department (MPD) for violating the nuclear safety law which imposes strict controls on use and transport of nuclear materials.

However, the prosecutors decided to release them because the law does not have any provisions banning transfer attempt and possession of nuclear materials. The legislature authorities did not assume possession and a sales attempt of nuclear materials by civilian people when they enacted the law in 1957, prosecutors said.

Released Friday were Toshiko Nishijima, 43, unemployed; Koichi Tsuru, 33, a securities firm president; Toshitada Mizuno, 44, a real estate company president; and four others. According to investigation by the prosecutors, three suspects, including Nishijima, got a bottle containing 101.75 grams of natural uranium and handed it over to four other suspects, including Tsuru.

Tsuru and three others brought the bottle to the U.S. Embassy on August 8 as part of the four kilograms of uranium the group attempted to sell for 12 billion yen. The Science and Technology Agency's analysis showed that the uranium they brought was 70.7 percent pure refined natural uranium. A total of 11 suspects have been arrested in the case and the prosecutors are carefully considering whether or not to indict the four other suspects.

Ministry Denies Warships To Escort Plutonium

*OW0610132689 Tokyo KYODO in English 1246 GMT
6 Oct 89*

[Text] Tokyo, Oct. 6. KYODO—The Foreign Ministry Friday denied that the government is studying a plan to use SDF [Self-Defense Force] vessels to escort ships carrying plutonium from Europe to Japan. "Nothing is changed in the government's plan to escort ships transporting plutonium back to Japan by ships of the Maritime Safety Agency, not the Self-Defense Forces—that plan is not changed," Taizo Watanabe, the ministry's spokesman said.

Plutonium Use Strategy Group Established

*43063049r Tokyo GENSHIRYOKU SANGYO
SHIMBUN in Japanese 11 May 89 p 1*

[Text] On 9 May the Japan Atomic Energy Commission established the Expert Subcommittee on Nuclear Fuel Recycling (Subcommittee chairman, H. Murata, Chairman of the Board of the Japan Atomic Energy Promotion Foundation) in order to consider concrete policies to promote the use of plutonium in Japan. Their first meeting will be at the end of this month and they will proceed with the consideration of subjects such as 1) the use of plutonium in light water reactors, 2) ways of advancing the establishment of systems for the production of mixed oxide (MOX) fuels, 3) ways of advancing the transport of returned plutonium, and 4) ways of advancing the utilization of reprocessed uranium. They expect their initial focus to be on the transport of returned plutonium which will begin to be returned from Great Britain and France in 1992.

The purpose of the Expert Subcommittee on Nuclear Fuel Recycling established here will be, on the basis of long-term calculations, to investigate and consider overall concrete nuclear fuel recycling policies regarding the normalization of reprocessing to be performed under contract overseas, the development of a plan for a private-sector reprocessing plant at Rokkashomura in Aomori Prefecture, and the rate of progress in developing new types of reactors.

As a preliminary step, in January of this year the Science and Technology Agency studied the matter by establishing the "Round Table Discussion on Plutonium Use" (Round Table Leader, H. Murata). The Round Table plans to consolidate its point of view on the 11th

of this month. Upon receiving these results, the subcommittee will advance their studies further.

In specific terms, their principal subjects for consideration will be 1) ways of advancing plutonium use in light water reactors as one form of demand for domestic plutonium use, 2) ways of advancing the establishment of systems for the production of mixed oxide (MOX) fuel, 3) ways of advancing the utilization of reprocessed uranium, etc.

Of these, in regard to the transfer of returned plutonium, they have considered policies in outline form for accomplishing the ocean transport, but in this case, under the terms of U.S.-Japanese agreements, escort ships will be necessary and because this is a matter for next fiscal year's budget, the reaching of a decision on this question is anticipated at an early stage.

In this sense it is expected that as the subcommittee initially studies a manual for the transport of returned plutonium, it will also investigate things such as the amount to be transported in light of domestic demand for plutonium.

Testing Slated for New BWR Fuel Assemblies

*43063049s Tokyo GENSHIRYOKU SANGYO
SHIMBUN in Japanese 25 May 89 p 2*

[Text] This fiscal year, the Nuclear Power Engineering Test Center will begin "thermohydraulic testing of new-type BWR fuel assemblies." These experiments will confirm the integrity of the thermohydraulic design of this new fuel which aims for higher burnup rates. The project will require 5 years in which they will conduct limited output tests which will use a tube nest void test facility to verify the thermal integrity of the fuel and hydraulic vibration tests which will verify integrity by confirming thermal and vibrational margins for the fuel assemblies.

In order to avoid reductions in thermal margins which follow increases in uranium enrichment rates and reductions in reactor shutdown margins in these new-type BWR fuel assemblies which aim for high burnup rates, they plan to utilize either a new type of spacer in which heat removal results will be increased by changing existing lattice types to cylindrical (round cell) types, or a large diameter waterload which will increase burnup efficiencies by increasing the water to uranium ratio and enlarging the domain in which the water does not boil. Compared to existing improvements such as increasing the number of fuel rods, this will radically change basic elements and so through the utilization of new structural spacers or large diameter waterload, they will confirm that none of the fuel rods become difficult to cool and suffer thermal damage (burnout) and that the fuel rods do not vibrate easily, giving rise to fretting abrasion (the fuel rod cladding tubes wear down by rubbing against the spacers) and damaging the fuel.

Furthermore, in order to reduce fuel cycle costs, advanced boiling water reactors (ABWR) are being designed with increased ranges of core flow regulation and it will be necessary to confirm the fact that integrity can be maintained in light of hydraulic vibration from fuel rods, etc. during flow adjustment operations.

During limited output testing, they will use full-size simulation fuel assemblies with the new fuel, duplicate normal and emergency nuclear reactor conditions, and measure the limited outputs. By comparing measured data with design values, they will verify the reliability of the thermohydraulic design process.

During hydraulic vibration testing, they will confirm the mechanical integrity of the fuel rods, water load, etc. by measuring hydraulic vibration data with two-stage flow, under high temperature, high pressure conditions the same as those within a nuclear reactor.

Plans call for basic design which will decide the concepts behind the content of the tests to begin this fall, construction of the test facility to begin next fiscal year, and testing to commence in 1992.

Copper Vapor Laser Developed for Uranium Enrichment

43063049q Tokyo GENSHIRYOKU SANGYO SHIMBUN
in Japanese 4 May 89 p 2

[Text] On 29 April Kansai Electric Power announced that in cooperation with the Laser Technology Research Laboratory and Toyo Denki Seizo, it had developed a highly reliable, long-life copper vapor (CV) laser which uses semiconductor elements in its power source.

Copper vapor lasers will be essential to next generation uranium enrichment methods and in recent years research into improving their performance has expanded enthusiastically both here and abroad. In order to use CV lasers in uranium enrichment, an important research topic has been the development of power source equipment with the capability of generating pulses in the 100 watt class for one 10 millionth of a second and repeating them 5,000 times per second. Specifically, because the elements performing laser oscillation require superhigh speed switching (one 10 millionth of a second), high voltage (15,000 volts), and high current (1,000 amperes), unique discharge elements (thyatrons) meeting these conditions have been utilized in CVLs. However, thyatrons are not only expensive, but also have short lives of about several hundred hours and in order for CVLs to reach the practical use stage, the development of longer-lived, reliable elements has been anticipated.

The principal result here has been the fulfillment of these requirements by the introduction of semiconductor elements such as long-life thyristors. These elements are called "high power semiconductor element static induction (SI) type thyristors" and were developed in 1975 by Professor Nishizawa of Tohoku University. They are

capable of high speed switching at high voltages with large currents and specifically show extremely strong characteristics with rapidly rising large currents.

With this laser device they succeeded in increasing pulse control speeds and in pulse compression (for laser oscillation, compression is necessary to the degree required by the pulse width) by not only arranging these SI thyristors in multi-stages so that they could withstand high voltages, but also by utilizing magnetic switches with strong, cobalt-type, amorphous magnets.

NORTH KOREA

NBC Weapons Efforts Described

ROK Defense Ministry Report

SK2009010489 Seoul THE KOREA TIMES
in English 20 Sep 89 p 3

[Text] North Korea has set up two germ culture centers and four related facilities and put them in full operation in an apparent effort to research and develop biological warfare capabilities, according to the Ministry of National Defense.

The Defense Ministry said yesterday in a report to the National Assembly for inspection it was possible that Pyongyang had secured at least 12 species of germs including choleraic bacteria.

The ministry analyzed that the qualities of the bacteriological germs were poor and improper for production of biological weapons.

But the ministry commented it could not discount the possibility of North Korea promoting the research and development activities to upgrade germs so they are good enough to manufacture bacteriological weapons with.

In the report, the ministry also expressed great worry that North Korea is capable of developing and manufacturing nuclear bombs on its own sooner or later by expanding the nuclear processing facilities in Yongbyon North of Pyongyang.

North Korea is ready to deploy SA-5 long-range surface-to-air missiles in the Tok Chae and Hwangnyong Mountains, according to the report, activating 12 new commands for the regional defense.

The ministry revealed that eight divisions took part in the annual Korea-U.S. combined military training exercise "Team Spirit" respectively in 1985 and 1986 and 10 divisions respectively in 1987 and 1988.

It also forecast that the continued military buildup of Japan with its five-year modernization programs would be a "cause of concern" for the regional security in the Southeast Asian region in the 1990s.

More on NBC Threat

SK2009104689 Seoul CHUNGANG ILBO
in Korean 18 Sep 89 p 2

[Text] According to Ministry of National Defense data, submitted to the National Assembly on 18 September, "North Korea has 2 laboratories and 4 research institutes devoted to breeding 12 kinds of germs, such as cholera, and the Ministry is now strengthening its protection posture against the use of biochemical weapons by North Korea, including development of devices to detect and identify them, and the production of anti-dotes."

However, the Ministry of National Defense said that our side is not producing bacteriological weapons.

Commenting on the danger of biochemical weapons, the Ministry of National Defense said that a fighter, full of biochemical weapons, dropping such weapons on a city, can damage an area as wide as 1,000 square kms, meaning that most of the Seoul area would be affected, and if such chemical weapons were to be dropped over Seoul, they are so powerful that at least one-fourth of Seoul's population, 2.5 million, would be killed.

Nuclear Weapons Capabilities Detailed in ROK Report

SK0710011089 Seoul THE KOREA TIMES in English
7 Oct 89 p 3

[Text] North Korea is capable of manufacturing 13 to 33 nuclear bombs whose power is of the same size as the atomic bombs dropped by the United States on Hiroshima and Nagasaki during World War II, if it makes a bid to develop an atomic arsenal.

The nuclear capability of North Korea was revealed in a report tendered by the government authorities concerned to a parliamentary inspection yesterday.

North Korea began to operate an atomic reactor capable of producing 30 megawatts for research and development at the nuclear research center in Yongbyon north of Pyongyang in October 1987, according to the government authorities.

The authorities said in the report that North Korea is likely to have secured somewhere between 200 and 500 tons of nuclear fuel as the atomic pile consumes an annual average of 75 tons of natural uranium.

Pyongyang can produce 13 nuclear bombs at a minimum and 33 bombs at a maximum, with power equivalent to those detonated by the U.S. over Hiroshima and Nagasaki in Japan during World War II, the authorities predicted, if it wants to go nuclear.

It was also disclosed in the report that North Korea has almost completed construction of two reprocessing facilities capable of extracting plutonium out of the nuclear fuel in Yongbyon.

The government authorities appraised that North Korea has quite a firm "intention" of developing and stockpiling nukes, considering that it continues to expand related facilities despite its stunted economic capability.

North Korea, the authorities also pointed out, has refused to conclude a safety agreement with the International Atomic Energy Agency.

The authorities added that North Korea installed a Soviet-supplied experimental atomic reactor capable of producing 2 to 4 megawatts in Yongbyon for the first time in the mid-1970s designed to stockpile radioactive isotopes for medical and industrial purposes.

SOUTH KOREA

Ninth Nuclear Power Plant Begins Operation

SK0110013589 Seoul THE KOREA TIMES in English
1 Oct 89 p 8

[Text] Nuclear Unit 2 at the Ulchin Nuclear Power Plant went into full-scale commercial operation yesterday, bringing the number of Korean nuclear units to 9, the Energy-Resources Ministry said.

The unit, having a capacity of 950,000 kilowatts, successfully passed the final performance test on Sept. 24.

It will be able to generate electric power totalling 6.25 billion kwh annually and is expected to effectuate an import substitution for 9 million barrels of oil, a ministry official explained.

With the full-scale operation of unit 2, the portion of nuclear power will grow to 36.3 percent from the present 33.4 percent in nuclear power capacity and to 53 percent from 46.9 percent in total power production in Korea.

The construction of Ulchin Nuclear Unit 2 started in January 1981 and cost a total of 1,059 billion won and 4.95 million workforce.

The construction has been carried out on an island basis under the management of the Korea Electric Power Corporation. The nuclear island (primary system) was undertaken by Framatome of France and the conventional island (secondary system) by Alstome, also of France.

The Unit 2, along with the Ulchin Nuclear Unit 1, which went into commercial operation in September last year, is the first of its kind in Korea ever undertaken by French companies. It is a pressurized water reactor (PWR) type.

Tong-a Construction Industrial supplied a civil engineering part, Korea Heavy Industries and Construction a power supply equipment part and a number of other Korean companies also participated in the project.

With the active participation of Korean companies, the localization rate in the project was raised to 40 percent.

Nuclear Fuel Processing Plant Dedicated at Taedok

SK2909041589 Seoul THE KOREA TIMES in English
29 Sep 89 p 8

[Text] A nuclear fuel fabrication plant for pressurized water reactors (PWR) was dedicated yesterday, paving the way for Korea to take the first step toward localizing its nuclear power technology and maintaining energy self-reliance.

A ceremony heralding the completion of the fabrication plant took place at the Taedok Science Town in Taejeon with the attendance of Prime Minister Kang Yong-hun and Energy-Resources Minister Yi Pong-so.

The fuel fabrication plant, the first of its kind in Korea, is equipped with a uranium reconversion facility capable of producing 200 MTU (metric tons uranium) annually and a fuel rod and assembly manufacturing plant.

Production is sufficient enough to meet the nuclear fuel demand for Korea's eight PWR nuclear power plants now in operation, an official at the Korea Nuclear Fuel Co. [KNFC] said.

Construction for the plant started in November 1986 and cost 82.9 billion won.

Fuel fabrication is one process of nuclear fuel recycling with one bundle of fuel producing 124 million kilowatts of electric power per hour, which is equivalent to one year's consumption by 80,000 households.

The power production of one pellet amounts to 1,280 kwh, which is equivalent to 10 months' consumption by one household.

With the completion of the plant, Korea became the 11th country to achieve self-reliance in nuclear fuel technology and it is expected to trigger an import substitution effect amounting to \$35 million annually, the KNFC official said.

Korea's localization plan for nuclear fuel technology is a 15-year program having three stages. The first stage, set for 1987 to 1991, calls for self-reliance in design and fabrication technology and for mass production of PWR fuel.

Energy Minister Calls for Nuclear Agency

SK2009022689 Seoul THE KOREA HERALD
in English 20 Sep 89 p 6

[Text] Minister of Energy and Resources Yi Pong-so yesterday called for the creation of an international nuclear regulatory agency to deal with safety and related issues.

"Such an agency will develop internationally agreed codes of practice covering technical, economic, social

and political components of nuclear energy and will complement the role of the IAEA (International Atomic Energy Agency)," Yi said.

Delivering a keynote speech on behalf of developing countries at the 14th World Energy Conference assembly in Montreal, Minister Yi said developing nuclear options provides credible solutions for both availability and environmental questions particularly for resource-poor developing countries.

He said nuclear energy has been the prime vehicle to reduce the nation's excessive dependence on foreign energy sources and the task it faces is to heighten its self-sufficiency in capital and technology.

Pointing out that the major challenge the nuclear industry faces is how to resolve the safety issues, Minister Yi called upon the international nuclear community to face squarely the antinuclear sentiments to resolve the safety issues once and for all.

The Korean minister emphasized stability and availability of energy for sustained global economic growth.

In view of the importance of conservation and renewable energy sources, he said, the role of industrialized countries and cooperation between developed and developing countries are crucial.

"In developing new technologies for conservation and renewable energy, they should be expediting the transfer of these technologies to developing countries," Yi said.

Noting that a sustainable energy future requires selecting utilization of environmentally benign energy sources, he said a global approach is necessary to overcome trans-boundary phenomena of environmental degradation.

He said, "Here again, industrial countries, consuming 80 percent of world energy resources, should recognize that they are to carry the lion's share of the total burden and be willing to provide necessary aid to developing countries whose primary objective of economic growth is almost mandatory, to be compromised with environmental constraints."

Seoul Asks IAEA To Examine North's Facilities

SK2709034189 Seoul YONHAP in English
0318 GMT 27 Sep 89

[Text] Vienna, Sept. 27 (YONHAP)—South Korea, concerned that North Korea is developing nuclear weapons, has called for the International Atomic Energy Agency (IAEA) to examine the North's nuclear facilities.

Vice Science and Technology Minister Choe Yong-hwan, head of the South Korean delegation to the 33rd IAEA regular session here, met Tuesday with IAEA director-general Hans Blix to request his best efforts to get Pyongyang to sign the full-scope nuclear safety regulation, indicating several recent reports that North Korea might possess nuclear weapons.

Blix, pointing out that several countries have urged North Korea to sign the provision, said IAEA will do its best to solve the problem by next February.

IAEA obliges all members of the nuclear non-proliferation treaty to sign the nuclear safety regulation and to allow IAEA experts to inspect their atomic plants to prevent fissionable materials from being diverted to weapons use. South Korea signed the treaty in 1975 and also signed the regulation. North Korea, however, has not yet signed the safety regulation though it signed the treaty in 1985.

A U.S. official recently urged Pyongyang to abide by the safety regulation, saying the United States and the Soviet Union are gravely concerned that North Korea is developing a nuclear capability.

North Korea has denied the reports, accusing the United States of spreading groundless rumors.

Chong Kun-mo Elected IAEA Chairman

SK2609022289 Seoul *THE KOREA TIMES* in English
26 Sep 89 p 1

[Text] Vienna (REUTER)—A row between the two Koreas that threatened to mar the start of the International Atomic Energy Agency's [IAEA] annual conference on Monday was averted when North Korea withdrew its candidature for conference chairman.

North Korea's ambassador to the IAEA, Choe Ki-chol, withdrew in favor of South Korea after the Far East group of nations were unable to choose between them in last-minute talks.

"My delegation did not expect such a complicated situation regarding the election of the president of this conference," Choe told the meeting.

Last year's president, Malaysian representative Halim Bin Ali, asked the conference to vote between the two candidates after the group, which also includes Japan and the Philippines, failed to reach a decision.

But Choe said: "We think voting should be avoided. It would undermine consensus traditions and create a precedence for the future." The majority of the IAEA's 113 member states did not want confrontation, he added.

With the North Korean withdrawal, South Korean atomic energy commissioner Chong Kun-mo became president without a vote.

THAILAND

Long-Term Energy Plans, Reactions to Nuclear Power

NESDB Official on Strategy

42070112 Bangkok *SIAM RAT* in Thai 22 Aug 89 p 6

[Text] Mr Phisit Phakkasem, the secretary general of the National Economic and Social Development Board [NESDB], disclosed that those attending the meeting of the National Energy Policy Committee on 21 August discussed the electricity situation. They discussed revising the master plan of the Electricity Generating Authority of Thailand (EGAT) in order to solve the power shortage problem. EGAT submitted a new master plan composed of two lines. That is, the electricity generating capacity will be increased as already approved by the Sixth National Economic and Social Development Plan. EGAT will generate more electricity than the installed generating capacity. Technologically, some power plants can generate more electricity than the installed generating capacity. Also, power plant maintenance plans will be revised by postponing closures, means will be found to purchase electricity from Laos and Malaysia, and measures will be implemented to make more efficient use of the electricity.

The implementation of this new plan will eliminate the energy shortage predicted for May 1990. It had been predicted that there would be an electricity shortfall of approximately 1.3 percent. This revised plan will make it possible to generate an additional 750 megawatts of electricity. Instead of the reserve amount being a negative 1.3 percent, the reserve generating capacity will be 10 percent. Besides this, the use of different electricity rates depending on the time of day (TOD) will help reduce the use of electricity during peak use periods.

Mr Phisit said that at the meeting, Gen Chatchai Chunchawan, the prime minister, asked that a strategy be implemented for purchasing more electricity from neighboring countries. The committee passed a resolution to have EGAT stipulate measures to encourage those industrial factories that have their own generators to sell electricity to EGAT from 1830-2030 hours. EGAT must work out the details and inform the industrial factories.

Official Comments on Reactor Plans

42070112 Bangkok *SIAM RAT* in Thai
24 Aug 89 pp 5, 12

[Excerpt] [Passage omitted] In his capacity as the person in charge of monitoring the activities of EGAT, Mr Anuwat Wattanaphongsiri, the minister attached to the Office of the Prime Minister, talked about the construction of a nuclear power plant. He said that studies have shown that by the year 2001, domestic energy sources that can be used to generate electricity will not be sufficient to meet demand, and it will be necessary to import electricity from abroad. Thus, we must consider

other sources of energy to generate electricity after 2001. EGAT has been studying nuclear power plants for a long time. We need to discuss whether the use of such power plants would be appropriate. Preparations must be made in advance, because it will take approximately 12 years to build each nuclear power plant.

Nuclear power plants cost more to build than do other types of power plants. But over the long term, it is worth it, because a nuclear power plant can produce more electricity and at a lower per unit cost. Besides this, in the future, the production of electricity at other plants may encounter problems. For example, power plants that generate electricity using water may not have sufficient water to generate electricity. Also, it requires huge amounts of coal to generate electricity, and this causes pollution problems. He said that he will visit nuclear power plants in Europe in order to gather data and discuss this matter. EGAT will start providing information to the public on nuclear power plants. Almost all of the NICs [newly industrialized countries] have nuclear power plants.

Mr Anuwat said that in considering building nuclear power plants, officials will consider the suitability of this. And the obstacles must be considered, too. For example, studies have shown that in building a nuclear power plant, problems may arise in transporting the nuclear reactor. Reactors are very large and must be transported by sea. Some countries prohibit nuclear reactors from being transported through their waters. If it is decided to build nuclear power plants, the plants must be at least 900 megawatt plants.

A report released by EGAT stated that regarding electricity generating capacity in 2001, EGAT will have a total installed generating capacity of approximately 96,375 megawatts. Demand is expected to be approximately 85,000 megawatts. Thus, there will be a reserve of about 10 percent. The cost of building a nuclear power plant is about 51,000 baht per kilowatt. Thus, building a 1,000 megawatt power plant will require an investment of approximately 51 billion baht.

Electricity Authority Investment

42070112 Bangkok *SIAM RAT* in Thai
24 Aug 89 pp 5, 12

[Excerpt] [Passage omitted] Mr Anuwat Wattanaphongsiri, the minister attached to the Office of the Prime Minister, disclosed the results of the joint meeting held by the NESDB and the three electricity generating authorities on 23 August. He said that with respect to investment, EGAT submitted an investment plan covering the period 1989-1999. This plan calls for increasing the power generating capacity by an average of 688 megawatts a year. This will cost an average of 33 billion baht a year, which includes EGAT investment funds. That totals approximately 330 billion baht over the next 10 years.

Besides this, in increasing the electricity generating capacity over the next 10 years, EGAT will ask for the cooperation of the units concerned with the increase in demand for electricity, such as the Board of Investment, the Department of Industrial Works, and the Department of Public Works. They must provide data on approved projects that will increase the demand for electricity so that these data can be used in formulating plans to increase the electricity generating capacity to meet the increased demand.

Mr Anuwat said that the Provincial Electricity Authority will be the unit that distributes approximately 80 percent of the total electricity generated to the people. It will spend about 9 billion baht a year in developing the electricity distribution system and in laying carrier lines in the areas that do not yet have electricity. Electricity must be distributed to about 2,250 rural villages that do not have electricity.

As for the Metropolitan Electricity Authority, according to the plan, the amount of electricity distributed to the people will increase approximately 6 percent a year. According to the original plan, this required an investment of about 5 billion baht a year. But because demand has increased because of the economic growth, it will be necessary to increase investments to 8 billion baht a year.

Opinion Leaders Oppose Nuclear Power

42070112 Bangkok *MATICHON* in Thai
18 Aug 89 pp 1, 21

[Excerpt] [Passage omitted] MR [royal title] Khukrit Pramot, the former prime minister, talked about the plan of Mr Anuwat Wattanaphongsiri, the minister attached to the office of the Prime Minister and the man who is responsible for monitoring EGAT, to build a nuclear power plant. MR Khukrit said that he disagrees with this idea, because he opposes nuclear power. Thailand is a member of ASEAN, whose objective is to keep this a nuclear-free zone. Thus, we can't have nuclear power plants here even if they will not be used for combat purposes. Because an explosion or a leak will pose a great danger and result in losses.

"Measures to prevent leaks are not foolproof. The Soviet Union, for example, is much more experienced in this than Thailand and yet a leak occurred there. Thailand is new at this. Other ways must be found to increase electricity production. We can purchase fuel or coal or use heat energy. We are not in a crisis situation with respect to electricity. We can find other ways to increase the production of electricity," said MR Khukrit. He added that neighboring countries need electricity, too. We must work together. We can work with Burma and Laos, for example, in producing electricity. We should focus on reaching an agreement with them or cooperating with those countries instead of thinking about using nuclear power.

Gen Chatchai Chunhawan, the prime minister, said that the nuclear power plant program is just a project that is being studied based on data obtained previously. Mr Anuwat just wants to look at the plans formulated previously. There aren't any problems, because Thailand still has enough lignite and gas to produce electricity for another 10 years or more. And we could use solar energy.

Mr Phichai Rattakun, the deputy prime minister and leader of the Democrat Party, said that in producing electric power, we should use water and gas even though the number of people using electricity will increase every year. It is predicted that a crisis will arise in May 1990. But the government has already taken steps to deal with that. After that month, Thailand will have electricity reserves of 10 percent. During the next 5-20 years, there will definitely not be any shortage of electricity. He said that EGAT studied the feasibility of building nuclear power plants once before. But that will require more in-depth studies to determine the advantages and disadvantages.

Mr Phichai added that Mr Anuwat may be looking at what might happen in the future and so he is formulating a draft plan in order to be prepared. Forty years from now, it may be necessary to build these plants. But this is not the time.

"As the person who is responsible for monitoring environmental conditions, I feel that nuclear power always poses a danger. Thais still have a great fear of nuclear power," said Mr Phichai. Mr Prachuap Chaiyasan, the minister of science, technology, and energy, said that he does not have a view on this matter. He said that he would have to ask Mr Anuwat if he really has formulated a plan and what action will be taken. But as far as he knows, Thailand still has the capability to generate sufficient electricity from water, coal, gas, and imported oil. If a shortage of electricity does arise, there is another alternate source of energy, that is, we can use agricultural by-products to produce heat to boil water. The steam can be used to run the generators. One of these agricultural by-products, which is in large abundance in Thailand, is bagasse. Outside the agricultural season, we can use lignite, coal, or fast-growing trees. The National Energy Administration is studying the data in cooperation with the private sector.

Mr Prachuap said that he had held talks with Australia about a joint investment in the construction of a power plant that uses coal. Australia will bring in the coal and build the plant and port facilities to unload the coal. It will also handle pollution matters. This power plant will be capable of generating 700 megawatts of electricity. This will be a joint public-private investment project. The details are now being studied.

POLAND

PAX Daily Examines Polish Nuclear Project

AU2109075989 Warsaw SLOWO POWSZECHNE
in Polish 18 Sep 89 p 3

[Rafal Jablonski article: "Clouds Over Lake Zarnowiec"]

[Text] When the construction of the nuclear power station on Lake Zarnowiec began in 1982, no one imagined the fortunes of this project would be so varied. Zarnowiec, as this project is popularly called, has divided society and engulfed enormous sums of money. For a time, the opponents of this project were victorious when the funds for it were suddenly withheld. But then a Council of Ministers resolution reversed this decision. However, there is still no money for the project because the bank has not unfrozen the credits.

The way in which the decision to build Zarnowiec was taken was very far removed from the principles of openness and democracy. The decision was taken arbitrarily, without a thought for the opinions of the local population. However, this might have been forgotten were it not for the Chernobyl accident, which caused storm clouds to gather over Zarnowiec.

A group of people suddenly became active. Bandyng about demagogic slogans and downright lies, they instilled fears of all sorts of plagues and calamities into the local population. Although this was all nonsense, the inhabitants, made gullible by the Chernobyl accident, believed every word. This was an understandable reaction against the arrogant conduct of the authorities and of experts of all kinds, who simply ignored the voice of society. The truth was distorted this way and that way, depending on one's parochial interests. If we remember that the local population had not the slightest idea about nuclear energy, we can understand their reaction when they read an article called "Zarnobyl" in the weekly MORZE [SEA].

And yet the country needed and still needs the electricity to be provided by this power station. Right now we have 32,000 megawatts at our disposal, which we have achieved thanks to an annual increase of 1,000 megawatts in the past. But during the past 5 years, the annual increase has only been half that amount. Situated as we are at the bottom of the league in terms of per capita electricity consumption, we have no hope of extricating ourselves from this void.

Now the void is all the more dangerous, because if any single component of our power generating system fails, we will feel the effects of a shortage of power, especially in winter. We all remember the electricity cuts at the end of the last decade. We can imagine what would happen in the event of an energy crisis if we look at Argentina, where the construction of new energy sources has been neglected to a surprising degree.

Two new power stations are to appear in Poland—a conventional one in Opole, due to be completed in 2 years time, and the other in Zarnowiec. Opole is to have a capacity of 2,000 megawatts, and Zarnowiec 1,860 megawatts.

We need the electricity to be provided by Zarnowiec, or else the entire energy situation may collapse in a few years time. We really have no alternative to completing Zarnowiec, for it would not be possible to build an alternative conventional power station in the same amount of time as it would take to complete Zarnowiec. Our energy system functions in a haphazard fashion, as it were. The only problem is that Zarnowiec is a nuclear power station. To make things worse, it is costly, unwanted, and delayed.

Apart from voicing hysteria, the opponents of Zarnowiec are citing an entire range of legitimate complaints about Zarnowiec. The chief complaint is that Zarnowiec is situated west of the Gdansk-Gdynia-Sopot conurbation. As we know, about 80 percent of the wind in this area blows from the West. If a breakdown should occur, a radioactive cloud would only have to travel 20 km before it reached Gdynia. It is best not to think about what might happen then....

Indeed, it is a problem. However, a nuclear reactor will never explode like a nuclear bomb, because the laws of physics say it cannot, and the reactors to be used in Zarnowiec are meant to operate according to principles completely different to those governing the reactors in Chernobyl. So there is no danger of a Chernobyl-type breakdown.

But that is not enough to pacify people, for they are aware of the standard of workmanship in Poland. After all, not even the slabs in sidewalks are laid evenly. Those in favor of Zarnowiec claim that the work on Zarnowiec is of a standard that is unheard of in Poland, everything is meticulously controlled. However, the opponents refute these statements, rightly or wrongly accusing the contractors of covering up botches. It seems that an impartial judge is and will be a control mission from the International Atomic Energy Authority [IAEA], which it is difficult to accuse of bias, in the end, no one in Europe wants to end up with another "Chernobyl" on his hands. The next quality control of the construction of Zarnowiec will take place in September, and one can be sure that the IAEA will not cover up its findings.

However, there is yet another argument against Zarnowiec. Its opponents maintain that the building costs go far beyond the permissible limit (of which more later). Thus, it is difficult to say whether the Zarnowiec investment will be a boon or a bane.

When work on the power station started, the date of completion was set at 1993. All four energy blocks were to be ready by then, each one with a capacity of 465 megawatts. The opponents claim that this is not enough power for the money that has been spent on the project,

and not everything about the project is state-of-the-art, but now that we have started and already spent so much money...

In terms of 1984 prices, Zarnowiec was supposed to cost Z155 billion. However, the economic crisis reduced the sum of money available for the project, as a result of which completion has been delayed. Even this year, subsidies for the project have been cut from Z85 billion to Z55 billion, whereas next year a subsidy of only Z13 billion is foreseen. These figures are all in terms of 1984 prices. Compare this to the Z155 billion envisaged cost of the project.

The shortage of money has caused and is still causing huge delays, and the schedules are not being adhered to. If all goes well, the first energy block will not become operational until 1994, and the second in 1995. It is difficult to say when the remaining two will become operational, because the second stage of the project has not even started yet, and the matter is further complicated by the existence of a hydroelectric power station also in Zarnowiec, with a capacity of 700 megawatts. So it is difficult to say what advantages a semicompleted project (only two energy blocks) will bring. Construction might even stop altogether, but not because of protests from ecologists and local residents, but because of a simple lack of money. Not only has outlay on the project been cut by Z30 billion, but the Bank of Gdansk has stopped the issue of credits for Zarnowiec.

Having encountered help from an unexpected quarter, the opponents have begun to celebrate—though a little prematurely, because the Council of Ministers resolution at the end of August ordered the bank to continue with the credits. But the Bank of Gdansk is only an agent in the transfer of money from the central budget to local budgets. Therefore, it has not unfrozen the credits, because it has no money. As a result, work is at a standstill.

Lech Hryckiewicz, director of Zarnowiec, told us that some 40 percent of the work is completed. However, many components have been ordered from Polish and domestic contractors that have to be paid for even if construction is stopped, for the power station would lose every court case involving breach of contract. There is also the question of what essential work has to be performed whether or not the power station is ever completed, work essential for reasons of security and health, such as the filling in of shafts.

Director Hryckiewicz claims that the cost of the above work would add another 40 percent to the total cost of the project. The following financial question emerges: Is it worth spending an extra 20 percent of the foreseen construction costs and having a half-built power station with only two reactors, or should we squander the 80 percent of the costs that we have already spent and close down the project?

The new government has announced a firm struggle against inflation. As we know, this is impossible without a freeze or even discontinuation of some major capital investments. Zarnowiec certainly fits into this category. However, I do not envy those who have to make a decision. On the one hand, they will want to combat inflation and meet society's ecological demands halfway, and on the other hand they will want to avoid a situation like in Argentina, where the energy industry has collapsed for want of new electricity sources. One must remember that some of our power stations are old, some of them over 25 years old, and are in need of refitting. Where would the energy come from then? From abroad? How would we pay for it?

Clouds are gathering over Lake Zarnowiec. They are gathering over the supporters and opponents of this project.

ARGENTINA

Obstacles to Continued Nuclear Development Noted

51002062a Buenos Aires LA PRENSA in Spanish
21 Aug 89 p 6

[Article by Miguel J. Culaciati: "The Argentine Atomic Explosion"]

[Text] On the occasion of the inauguration of the new CNEA [National Commission for Atomic Energy] directorate a few days ago, the nation's president announced that the government plans to finish the Atucha II nuclear-fired electric power generating plant and the heavy water manufacturing plant that is being built at Arroyito.

Unfortunately, he omitted all reference to the manner in which these two large-scale objectives are to be achieved. He also failed to address the issue of Argentina's nuclear policy.

These omissions give rise to deep-seated doubts.

In the first place, if the president plans to continue with the same nuclear policy that was followed by previous administrations, as would seem to be indicated by his disillusioning appointment of Admiral Castro Madero, we will be faced with the contradiction between a proposed privatization and relaxation of government controls on the one hand, and implementation of state-control and nationalization policies on the other, in this very costly area which is under the president's direct responsibility.

Argentina's nuclear policy, which, for several decades, has been headed almost permanently by Navy officers and career officials of the Commission itself, has had a state-controlled, nationalized, and monopolistic orientation thus far.

President Menem will need to study the situation in more detail to resolve the issue in the country's best interest.

The simple statement that "we shall complete" Atucha II and we shall put the heavy water plant into operation is no more than voluntaristic and shallow discourse; and this is undoubtedly not the fault of the one who so expressed himself, but rather of those persons to whom he turned for orientation and advice in the matter.

It is clear that all the world's developed countries are tending towards deregulation of nuclear energy for civil uses, especially as regards the generation of electric power, which in many cases, as in the United States, is totally in private hands.

There is also a clear orientation towards limiting ventures of this type, particularly since accidents suffered by various nuclear plants have demonstrated their potential dangerousness.

In the United States, for example, the building of new plants has come to a complete standstill; and in Sweden, all existing plants were dismantled following a referendum in which the people voted in favor of this action.

In our case, we had two nuclear power generating plants in operation and producing electricity: Atucha I and Embalse.

The first, which is now very old, utilizes German technology, and the second, a newer one, Canadian technology.

Atucha II, whose construction is at an advanced stage, is also of German origin, as would also be the future five or six plants, were they to be built, under a contract signed with the Siemens group.

Last year, an accident occurred in the Atucha I pressure vessel: A rupture at weak spots in sections saturated by heavy water, which is a carrier of tritium, a highly radioactive element.

When Atucha I was bought, the suppliers asserted, as they have done in the case of Atucha II, that in case of rupture of a component inside the huge sphere we all saw being assembled, on TV, the vessel's top cover could be removed to effect the necessary internal repairs, without danger.

This turned out to be impossible or very risky, and as a result it was decided to resort to a robot of Argentine construction, which, according to statements by the former president of the CNEA, was to have resolved the problem by May or even April 1989.

The problems were not all that simple, and today Atucha I continues shut down without a target date in view, nor even a probable one, for its reentry into service.

If for any reason this plant cannot be reactivated, an even greater problem looms: What to do with it, since the radioactivity accumulated in its basic components will last 2,000 years.

The Americans have calculated that the cost of dismantling and decontaminating a nuclear plant can equal the cost of building it: Some \$600 million at least.

Will Atucha I end up like Chernobyl, buried under tons of cement? Or can the engineers, who are working without respite, put it back into operation without opening the pressure vessel? And if so, for how long before one of its parts, which are already worn, ruptures again?

The system used in the Embalse plant, as has been mentioned, is different. Nevertheless, an accident has occurred in a similar plant in Canada, in which the danger was averted only thanks to the fact that the plant was one of a group including three others that were able to provide a sufficient quantity of cooling water to moderate the reaction.

Embalse has had a few difficulties, some of which have even given rise to investigations by the international nuclear safety organizations, fortunately without consequences.

We also have small reactors operated by the CNEA, located, generally speaking, in densely populated zones, which advisedly should be moved to zones where they would be less worrisome.

The CNEA operates nuclear power plants through a separate administrative body within the CNEA. The government should include nuclear electric-power-generating plants among the enterprises and organizations to be privatized or deregulated, while designating the CNEA as the oversight organization responsible for verification, safeguarding against failure, and monitoring, of what is done by the private-sector operators.

This is the only way to stem the continued bleeding of our national budget by these enterprises—which are responsible for a major part of our external debt and are hungering for more of our national resources—and to ensure that our plants will operate sooner and better.

Powerful interests are opposing this policy, of course. They include, to begin with, the company that furnishes the technology and is reluctant to see its juicy contracts come to an end. Then there are the big "popes" of public works (at highest possible cost), and part of the Commission's bureaucracy, which still does not understand that its truly useful function is the research, development, and monitoring of safeguards, and not the commercial operation of plants, which, like everything else the government does, is being poorly done. To say nothing of the fact that, should a serious accident occur, the only one to blame would be the CNEA.

The funding required to complete Atucha II and the heavy water plant, plus the repair of Atucha I, can attain a gargantuan sum, possibly as much as \$1 billion, a sum that the country does not have at its disposal.

Would it not be better to study a way to form a private or mixed company, using the nuclear plants directorate as its base, to operate the plants, maintain them, and complete their construction at no cost to the state and under strict supervision by the CNEA?

Assuming the nuclear plants would generate up to 15 percent of our national electrical power capacity, would not sales of that magnitude be of interest to the private capital sector?

The heavy water manufacturing plant is a different case. It is being built merely to satisfy the blind nationalism of some. There will be no market for what it produces, since the world market for heavy water is glutted.

In addition—and linked to the technical, political, and economic aspects of these problems—it is important that the nation's president propose to Congress the ratification of the Nuclear Nonproliferation Treaty and the

Tlatelolco Treaty. Failing to do so is causing us many problems, casting suspicion on everything we do in the nuclear sector, and thus relegating us to a costly segregation from technical progress.

Only in this way will President Menem produce Argentina's nuclear developmental explosion and utilize our accumulated human resources.

Air Force Chief Comments on Missile Project

Condor II Project To Continue

*PY0510181089 Buenos Aires DYN in Spanish
1140 GMT 5 Oct 89*

[Text] Buenos Aires, 5 Oct (DYN)—Air Force Chief of Staff Brigadier Jose Antonio Julia has said that Argentina will continue the Condor II missile project, over which some objections were reportedly raised in the United States during President Carlos Menem's recent visit.

Julia said that some questions regarding the missile were made to the president, "although very superficially." Julia stated, however, that there is concern in the United States, although "not at a high level."

"I thought that when I got to the United States the first thing they would ask me about would be the Condor II," but this was not so, Julia said. He pointed out that doubt prevails in the United States over the "possibility that Argentina will export their technology to some countries that could cause an imbalance of power in certain zones."

He made it clear that "the idea to manufacture the Condor came about in 1977-78 when the Air Force decided to develop the technology for a missile that would carry loads for a given distance. The idea is to place satellites into orbit, but with a change in the trajectory and the load, the missile could carry anything," alluding to the possibility that the missile could be used to carry nuclear warheads.

Julia added: "I think that the United States is not concerned about the possibility that Argentina will master this missile technology because it would never occur to any reasonable person that we would launch it at the Malvinas, Chile, or a neighboring country. We are a defensive country. We are basically interested in this technology as a means to place satellites into orbit, and, furthermore, if it were to be used for other purposes, it would be as a deterrent. It never entered our heads to mass produce missiles and thus set up a missile defense system."

Brig Julia denied that Argentina would stop the Condor project in exchange for U.S. purchase of "Pampa" airplanes from Argentina. He said that the handling of the missile issue "is at a political level now."

"If the president decides against exporting technology, then this will be the policy. If he says that, as a sovereign

country, we can export it to any country in the world, that will be the policy," Julia said.

The Air Force chief of staff said "it is very difficult" to enter the U.S. market, selling airplanes, because there is "much competition."

Speaking for PAGINA 12, Julia made it clear that if the United States purchases "Pampa" airplanes, it would be for an amount of \$7 or \$8 million. He pointed out, however, that this figure would have to be divided among the partners that would contribute with economic resources "so that the series is not discontinued with the 18th plane and we can continue to produce all 100 planes."

Julia said that "the idea would be to seek a joint venture with an American partner, or seek a joint venture with the Dornier Company, and then jointly seek a third U.S." partner.

Further Comments Reported

*PY1210171889 Buenos Aires TELAM in Spanish
2028 GMT 10 Oct 89*

[Text] Cordoba, 10 Oct (TELAM)—Air Force Staff Chief Jose Antonio Julia has said that the Condor project "will not be stopped." He also explained that this undertaking "is not related to the sale of the IA-63 Pampa plane" and the possibilities of financing the construction of the Condor.

Brigadier Major Julia said: "the Condor II is not part of a barter deal". He added: "This is an advanced project and it is not up to the executive branch to decide whether the Condor II will be exported. The Air Force is developing it; it is in the hands of the Air Force, that is all."

Defining whether this is a missile or a satellite-launching project, Julia explained: "It is propulsion unit capable of carrying a load to a specific distance and it can be adapted to any situation."

Julia also denied that foreign powers are exerting any pressure. He said: "If there are any, I am not aware of them." He added: "We should not have any trouble in developing our own technology. There might be some concern over the possible export of this technology to some countries that may use it for other purposes." He added: "it is up to the government to decide whether or not to develop this project."

Moreover, Julia admitted that the Air Force is facing difficulties over continuing the manufacture of the Pampa planes. He added: "If we do not find a partner for this undertaking, which is assured of success, only 18 Pampa planes will be manufactured." But he also said he is "highly optimistic" of finding a solution to the financial problem.

Julia also said that the Armed Forces "whole-heartedly support the process that has been implemented and the efforts being made to overcome this crisis."

Brig Julia also said he agrees with the pardon, with "the pacification of the country, with the need to look to the future, with the need to overcome old rivalries, and with the need to begin to build a new Argentina."

Brig Julia headed the ceremonies commemorating the 62d anniversary of the military aircraft factory in Cordoba. Also present at the ceremony were Defense Minister Italo Luder, Cordoba Governor Eduardo Cesar Angeloz, and other authorities.

Government Promulgates Law on Nuclear Security

*PY1110171489 Buenos Aires TELAM in Spanish
1324 GMT 10 Oct 89*

[Text] Buenos Aires, 9 Oct (TELAM)—The executive branch has promulgated a law approving the convention on quick notification of a nuclear accident and the convention on assistance in cases of nuclear accidents and emergencies.

This convention seeks to "increase international cooperation for the safe use and development of nuclear energy," besides "guaranteeing a high level of security in nuclear activities."

The law also orders that necessary measures be taken "to prevent nuclear accidents and to reduce the consequences of such accidents to a minimum, if they ever occur."

The government also promulgated a law approving the agreement between Argentina and the PRC on cooperation for the peaceful use of nuclear energy that was signed in Beijing in April 1985.

In the agreement, both countries stress that "the use of nuclear energy for peaceful purposes is an important factor to promote the economic and social development of the two countries." The document emphasizes the common will to implement a policy of "peaceful use of nuclear energy to achieve development."

The government also promulgated laws approving agreements on tourist cooperation that Argentina signed with the governments of Costa Rica, the Socialist Republic of Romania, and Canada.

The agreements will encourage bilateral tourism because we are "convinced that tourism creates conditions for a better understanding and good will among peoples, and facilitates relations between nations."

The government also promulgated a law approving the convention on consular functions between Argentina and Italy, and a law approving the amendments to the international convention on human safety in the seas.

BRAZIL

Space and Missile Programs Discussed

33420084 Brasilia CORREIO BRAZILIENSE
in Portuguese 6 Aug 89 p 16

[Article by Joaquim Monteiro: "Lacking Funds, Air Force Retires Piranha"]

[Text] According to Minister of Aeronautics Moreira Lima, the project for the development of the Piranha, the Brazilian missile, has been canceled because of the limited financial resources available to carry this undertaking forward. The project was turned over to Orbita Sistemas Aeroespaciais S.A. [Aerospace Orbit Systems, S.A.], which was established in 1987 in association with the Engesa [Specialized Engineers, Inc.], Embraer [Brazilian Aeronautics Company], ESCA [expansion unknown], IMBEL [War Materiel Industry], and PARCON [expansion unknown]. The enterprise, which still hopes to reactivate this program at some time in the future, was established for the purpose of developing aerospace equipment and manufacturing and marketing missiles and satellite launchers on domestic and foreign markets.

The supersonic aircraft of the Brazilian Air Force (FAB) are equipped with missiles. The Mirage, manufactured in France, carries the R-530 air-to-air missile and two R-550s for intercept missions. The North American F5-E used by the FAB is equipped with the French Matra. Brazil wanted to purchase the American AIM-9 Sidewinder for the wing launchers of this aircraft, but the North Americans do not export this equipment to Third World countries. The leading type of missile used by the Brazilian Navy on its frigates is the Exocet (French). With its current cost per unit, one could buy 10 Mercedes Benz convertibles.

As soon as the economic situation of the country is favorable for negotiations, the Aeronautics Ministry will try to purchase missiles to equip its supersonic aircraft—the Magic, from France, or an air-to-air missile produced in China. The estimated cost of the P-4 Sidewinder today is about \$60,000. However, its performance is not up to that of the French or Chinese products. It is still possible that the Ministry of Aeronautics will purchase the Israeli Phytan missile. This weapon was recently demonstrated for technicians at the ministry, and the FAB was pleased with its performance. Its cost was estimated 2 months ago at \$200,000.

Competition

In bidding, the FAB is prepared to pursue the same path as did the Army with the purchase of its helicopters, and it will face excruciating international competition. "Other international manufacturers of missiles are circling over the eagle's nest" in the hope of selling their products. The seller countries, in addition to those mentioned, include the Soviet Union, England, Italy, and Czechoslovakia. The Brazilian Air Force, which has

strengthened its military fleet with 105 aircraft, including 26 F5-Es and 79 AMXs (the latter are subsonic aircraft manufactured by a Brazilian-Italian consortium), cannot do without missiles to equip them.

The Brazilian authorities responsible for the Brazilian Complete Space Mission have now become persuaded that it is not possible, at least in the short term, to count on arranging the transfer of the most modern foreign technology for the development of a medium-range missile, which only such countries as the United States, France, England, China, Italy, and the USSR have. In view of the existing difficulties, the air minister himself, Moreira Lima, insists that Brazil should turn its attention to developing its Sonda IV project. The most difficult problem, in his opinion, is the construction of the launching vehicle. The missile, he emphasizes, can be found on the list of supplies in any country, but they will not transfer the latest technology. With the development of a Satellite Launching Vehicle (VLS), we will be halfway along toward the development of the missile. The greatest obstacle to the transfer of technology for the development of the Brazilian satellite launching rocket is that posed by the United States. Although the manufacture of the missile is not a priority goal for Brazil, the authorities involved in this sector will not allow access to any advanced technology in this field.

In the coming decade, Brazil is to manufacture a Satellite Launching Vehicle. This project is a part of the Brazilian Space Program, administered by the Ministry of Aeronautics.

Satellites

In the field of communications satellites, we in Brazil are having difficulty purchasing the components necessary for the development of a satellite launcher. The United States is trying to prevent France from selling Brazil the technology for the construction of a rocket engine. The U.S. authorities argue that their position is based on the fear that, in the future, Brazil might use this technology to develop a ballistic missile, although the French authorities have given assurance that the Viking engine used in the first stage of the launching rockets does not lend itself to military uses. Next year Brazil is scheduled to launch two Ministry of Communications Brasilsats communications satellites. France is expecting a response from Brazil concerning these launchings. In the Brazilian program, the launching of this equipment by the French is linked with the granting of a license to manufacture the Viking propulsion apparatus, said to have applications in both the civil and military sectors. The transfer of the Viking technology also includes the training of Brazilian missile technicians. On the other hand, the French included a clause in these negotiations requiring a promise from Brazil to use the "Ariane 2" rocket in the launching of the two satellites." This launching is expected to cost Brazil about \$100 million.

Sonda IV Project

In the coming decade, perhaps during the administration of the government which will be elected on 15 November, Brazil will build its first Satellite Launching Vehicle (VLS). This is the prospect foreseen by Minister of Aeronautics Octavio Moreira Lima, who initiated the Brazilian Space Program. The hopes at which the concrete aspects of the Sonda IV project hint will now depend on the willingness of the government leaders and the resources made available by the National Congress, which must approve the federal budget and the allocation of funds for research in the country.

Sonda IV is a part of the Program of Missile Research and Development for Civilian Uses (a part of the Brazilian Complete Space Mission), which is administered by the Ministry of Aeronautics as the real economic situation in the country allows. The program has been pursued on the basis of this guideline, including the development of the Satellite Launching Vehicle for lower orbits, with the first satellite launching planned for the beginning of the next decade. The Sonda IV project incorporates the main technologies essential for the manufacture of the VLS. This line of action involves a great many of the technological processes in the areas of compound materials, ultrahigh-resistance steel, propellants, directional control of the rocket thrust vector, engines, etc.

The next prototypes of the Sonda IV will include new technologies, in particular the system for piloting by means of a movable nozzle, in the second stage. In the last experiment, only the first stage of the rocket was equipped with a directional system. In order to achieve this goal, digital technologies for controlling the directional system are being developed with a view to replacing the present analog system in the later prototypes. Prior to the flight of the PTO-3 prototype, the nose cones were fixed and inseparable from the payload. For the subsequent flights (PTO-4 and PTO-5), they are to incorporate technologies which will allow them to be ejected at given stages in the flight.

The Sonda IV project, which has been entrusted to the Space Activities Institute under the Ministry of Aeronautics, calls for a total of five launchings (three have already been carried out) in order to develop it operationally as a probe rocket, while also, and on a parallel basis, including a series of subcomplexes and systems which will be used for the VLS. The principal task at the moment is to master control of the rocket system and the solid propellant engines, 1 meter in diameter, since they are an integral part of the VLS.

The Sonda project of the Ministry of Aeronautics, which includes Sonda I, II, III, and IV, represents the Brazilian hope in the area of leading technology for achieving advances in the manufacture of the VLS, and later, missiles, although the manufacture of missiles is not the goal of the military.

The first rocket in the project (Sonda I) is designed for meteorological research. It can carry payloads of 5 kg to altitudes of 70 to 120 km. The mass of the payload is 4.2 kg, the total mass on launching 59 kg, the maximum velocity 1,380 meters per second, the maximum acceleration 250 meters per second, and the maximum apogee 65 km. The Sonda II is a single-stage rocket with a composite solid propellant designed for scientific research. Its engine is also used for the Sonda III.

The Sonda III is a two-stage probe rocket with composite solid propellant, which can carry a payload of 60 kg to an altitude of 600 km. Its characteristics include a payload mass of 60 kg, total mass on launching 1,581, a maximum speed of 3,120 meters per second, mass of propellant 1,095 kg, and a maximum apogee of 600 km.

Presidential Candidates State Views on Nuclear Policy

33420093 Sao Paulo FOLHA DE SAO PAULO
in Portuguese 1 Sep 89 p B6

[Article by Roger Ferreira]

[Excerpts] Whichever candidate is elected president of Brazil the end of this year, the country will continue to invest in nuclear research, for the sake of technological development. The main candidates support Brazil's mastering of nuclear technology, but state that using atomic power to produce electricity should be postponed until other available sources of energy are depleted.

Only candidates Paulo Maluf (PDS [Social Democratic Party]) and Ulysses Guimaraes (PMDB [Brazilian Democratic Movement Party]) support using atomic power immediately to generate energy. Ulysses claims that Brazil needs to use its enormous radioactive mineral deposits, and Maluf says that the regions with depleted hydroelectric potential need nuclear energy. Fernando Collor de Mello (PRN [National Reconstruction Party]) said that this energy requires the "social, political and economic maturity" of society. In Mario Covas' (PSDB [Brazilian Social Democratic Party]) view, Brazil has the ability to overcome its energy needs by the end of this century without resorting to nuclear power.

Guilherme Afif Domingos (PL [Liberal Party]) states that he prefers "clean" (nonpolluting) forms of energy, and that he would "try to deactivate Angra I." Candidate Robert Freire (PCB [Brazilian Communist Party]) cites an Eletrobras study that Brazil will only need nuclear energy after the year 2015. Luis Inacio Lula da Silva (PT [Workers Party]) and Affonso Camargo (PTB [Brazilian Labor Party]) also support postponing the use of nuclear energy.

Collor, Covas and Freire support splitting up the National Nuclear Energy Commission (CNEN), an entity that currently plans, executes and finances the Brazilian nuclear development program, so as to avoid accidents like the one at Goiania (see below). Collor

states that those functions should be exercised by different organizations, to increase their efficiency. Covas supports the creation of an independent financing body. Freire would uncouple the CNEN from the national defense apparatus, subordinate it to the Ministry of Mines and Energy, and create a funding agency staffed by scientists.

Lula would like to create a "highly competent nuclear regulatory commission." Ulysses intends to maintain the entity "under the terms of the Constitution and the law." Camargo would "place it under society's control."

Only Lula says that if elected, he would not permit the manufacture of a nuclear propelled submarine. "We will transfer control of all military installations and laboratories to the National Council for Scientific and Technological Development (CNPq), including those at Aramar," he says. Collor would permit the construction of the submarine on the grounds that it would result in the development of technology for compact reactors. In Covas' view, suspending the project would be the same as denying Aerospace the development of jet airplanes.

Freire says that he is not against the country's "modernizing itself to defend its maritime frontier," but the submarine would have to be subordinate to his priorities. Camargo views the project as integral to the mastering of nuclear technology.

All the candidates declare themselves to be against the construction of an atomic bomb, but do not say whether they would support Brazil's signing of the Nuclear Weapons Nonproliferation Treaty. Brazil's failure to sign has resulted in sanctions by Washington.

The candidates disagree on their evaluation of the nuclear development program in Brazil. Collor states that the plan is incompatible with the country's economic conditions. In Covas' view, the program has secretive aspects because the great powers do not permit the transfer of technology in that area. Ulysses says that the "parallel program" is important for the country's development.

Lula states that he would replace the "parallel program of a military nature" with a plan discussed by society and by Congress. For Freire, the Armed Forces' activities in the area of nuclear power should be submitted to the discussion of scientists and the control of Congress.

Lula Would Like To Cancel Agreement

PT Presidential Candidate Luis Inacio Lula da Silva would cancel the agreement with Germany if he is elected. To Roberto Freire, the signs of parallel programs developed by the military are "worrying," as they are not under international safeguards like the agreements with Germany. This treaty still has some programs in progress and is being renegotiated.

In Collor's view, the agreement has been "against society's wishes," and is not in the national interest. He

qualifies the adjustments made until now by the government as "timid" and states that clear priorities should be defined, leaving aside the production of electricity. Lula states that he would not permit Angra 3 to be completed, and would only permit Angra 2 after "sufficient debate."

In Covas' view, the secret aspects of the Brazilian program should be submitted to Congress. He states that the project ceased to be parallel from the moment the government took it over.

Citing news on the Serra do Cachimbo wells and the secret Delta 2 and 3 bank accounts—which are being used in the parallel program—Freire mentioned three projects being developed by the military: the construction of the navy's submarine, Aerospace's enrichment of uranium using lasers, and the Army's attempt to produce plutonium, a fuel for atomic bombs. [passage omitted]

Ignorance on Topic

Several candidates demonstrated ignorance on some questions relating to nuclear energy. Afif Domingos said that "he would deactivate the two existing facilities." There is only one nuclear plant in operation in Brazil, Angra 1. Angra 2 and 3 are far from complete and work on them has been virtually suspended.

Afonso Camargo stated that Brazil, "thank God, has explicitly renounced development of the atomic bomb," when in truth the country has not signed any nuclear weapons nonproliferation agreement, despite the Constitution's only permitting the use of nuclear power for peaceful purposes.

Candidates' Opinions

- 1. Do you intend to use nuclear power to generate electricity?
- 2. What will you do to prevent accidents like Goiania from occurring?
- 3. What will you do with the National Nuclear Energy Commission (CNEN)?
- 4. Do you intend to develop the atomic bomb? The nuclear submarine?
- 5. What do you think of the Brazilian nuclear program?

Collor (PRN): 1) The atom is the alternative of the future. 2) He would fine-tune legislation and create a public power apparatus. 3) He would divide it and create an independent funding body. 4) No. He would permit the submarine so as to develop technology. 5) Unrealistic, it needs to be reviewed.

Maluf (PDS): 1) Yes, in areas deprived of hydroelectric resources. 2) Split off funding responsibilities to the states and municipalities. 3) The CNEN should be an advisory body. 4) No. He said nothing about the submarine. 5) He would centralize projects.

Covas (PSDB): 1) No, but he would develop the technology. 2) Finance nuclear agencies. 3) Split it up. 4) No. He would permit the submarine. 5) He would develop Brazilian technology.

Lula (PT): 1) The atom is the alternative of the future. 2) He would create a funding commission. 3) He would transfer it to the scientific community and society. 4) No. He would not permit the submarine. 5) He would cancel the agreement with Germany.

Ulysses (PMDB): 1) Yes, in Brazil it is necessary. 2) Investigate and control facilities. 3) Maintain it within the terms of the law. 4) The Constitution calls for peaceful use of the atom. 5) He would develop technical controls.

Afif (PL): 1) No, and he would deactivate the existing facility. 2) He would adopt a nuclear policy appropriate for the economy. 3) He would create a funding body consistent with available funds. 4) No. He said nothing about the submarine. 5) He would prohibit secret activities.

Freire (PCB): 1) No, he would develop technology for the future. 2) He would create a financing body. 3) He would split it up and transform it into an administrative body. 4) No. He would permit nuclear propulsion. 5) He would integrate the scientific community and Congress.

Camargo (PTB): 1) Yes, he does not say when. 2) He would adopt legislation and international procedures. 3) He would improve its operation. 4) No. He would allow the submarine. 5) He would not allow secret projects.

Goldemberg Defends Use of Nuclear Energy

51002160a Sao Paulo O ESTADO DE SAO PAULO in Portuguese 1 Sep 89 p 2

[Article by Professor Jose Goldemberg, rector of Sao Paulo University]

[Text] There is an interesting observation on nuclear energy by the great Italian political scientist, Norberto Bobbio, in his book, "Three Essays on Democracy": "After the Chernobyl nuclear power plant incident there was a more than ever heated debate on 'the future of nuclear energy.' Arguments pro and con clashed in that debate. Nevertheless, I am convinced that, once again, the ultimate decision will not be made on the basis of correct reasoning, but rather, depending on the good (or bad) interests of one economic group or another; or else, if the decision is entrusted to a popular referendum, based on the emotional choice of those who vote (meaning, among other things, only a part of the legally qualified voters). It is not true that the predominant interests are those with the best reasons."

These considerations of Bobbio's are very timely, because the concerns over the greenhouse effect caused by the burning of fossil fuels (and deforestation) are prompting a new analysis of nuclear energy's role.

Although they create other problems, nuclear reactors do not emit carbon dioxide, and hence do not contribute to the greenhouse effect. This argument has been used very persistently by the pronuclear groups and the nuclear industry, which hopes to reactivate its sales that have been virtually at a standstill for over 10 years.

There is enormous excitement among nuclear reactor manufacturers on the subject of "inherently safe" reactors, which could not give rise to accidents of the Three Mile Island or Chernobyl type.

What gave this excitement a great impetus was the recommendation from the 1988 Toronto Conference that carbon emissions be reduced 20 percent by the year 2005. New nuclear reactors could contribute to the attainment of this goal.

A simple calculation shows that the contribution of nuclear energy would be significant only if a new large-sized nuclear reactor were to go into operation every 3 days. There would be 2,000 new reactors in 20 years: five times the number existing at present. The total cost of a program such as that, in 20 years, would reach nearly \$10 trillion, an inconceivable effort in economic and political terms.

In the event that there were a wait for new types of reactors to be developed before initiating such an effort, it would be impossible to make any contribution to the goal set by the Toronto Conference, because the new types of reactors would not be capable of being produced in under 15 years.

Another argument often used against a major expansion of nuclear energy is that it requires highly centralized energy production and distribution systems, which also entails the existence of centralizing, and preferably authoritarian governments.

In countries such as West Germany, with its powerful state governments, it is difficult to obtain the necessary consensus for conducting a large nuclear program, and this is what led to its current standstill. The same thing is happening in the Soviet Union, where the combination of the Chernobyl accident and perestroika led to a dramatic reduction in the goals set before Gorbachev.

In view of the difficulties that widespread use of nuclear energy is encountering, it is fitting to ask whether there are alternatives or whether it would be worthwhile accepting a Chernobyl-type accident from time to time, in order to avoid the greenhouse effect. Would this be a reasonable price to pay, in order to avoid this effect?

According to Bobbio's position, there is no simple answer to this question, and it will be political decisions based more or less on technical arguments that will lead to a decision.

Meanwhile, alternatives are being developed, some more expensive than nuclear energy. There are many, however, who argue that large subsidies are built into the cost

of nuclear energy, and that if they were removed it would be impossible to compete with solar energy or other technologies.

Considering this situation, what appears essential is to keep the options open and not to act hastily. Despite what Bobbio claims, mankind has succeeded in finding its way up until now, and it will probably survive the present anxieties.

Arianespace Assures Liquid Fuel Technology

90ET0003z Sao Paulo GAZETA MERCANTIL
in Portuguese 23-25 Sep 89 p 16

[Article by Veronica Couto]

[Text] Rio de Janeiro—The director general for international affairs of the European consortium Arianespace, Klaus Iserland, was in Brazil last week to work out the details of the technological transfer program to be implemented in the event that this enterprise is chosen by Telebras [Brazilian Telecommunications, Inc.] to supply the rocket launchers for the next Brasilsat communications satellites, numbers 4 and 5. The decision to establish a technological agreement with Brazil, which was made about 15 days ago by French President Francois Mitterrand, went against pressures from the United States which did, on the other hand, lead to the withdrawal from the bidding of German, Italian, and English businesses, which are minority partners of Arianespace, according to sources at the consortium itself.

The United States challenged the plans for the transfer of French technology, which included support for Brazilian training in the production of space vehicles using liquid fuel propulsion systems, based on the treaty on nonproliferation of ballistic missiles signed by the seven great powers (Germany, Italy, England, the United States, France, Spain, and Japan), which forbids the supply of what is termed "sensitive technology" outside the boundaries of the signatory countries. The participants in the Arianespace consortium include France, which has 60 percent of the shares, and Germany, which has 20 percent, while the balance is distributed among England, Italy, Switzerland, and Belgium.

Iserland stated at a press conference held in Rio on Friday that he is concerned about the delay in the announcement by Telebras of the decision on the bids for the purchase of rocket launchers, which was scheduled for last June. He said that the change in the time periods for the project may compromise not only Brazil's telecommunications capacity (with the expiration of the

satellites in orbit, Brasilsat 1 and 2), but also the conditions for technological development between the two countries.

"The preparations for this bidding competition have already taken a year and a half; the construction of the satellites requires 3 more years; and 6 additional months are needed to obtain the launchers," Jacques Louis Mercier, the director of Montemer International, which represents Arianespace in Brazil, explained. He warned that the useful life of the satellites now in operation will come to an end in 1993 and 1995.

The transfer of technology, one of the requirements in the specifications, would be effected by Arianespace, in conjunction with the Aerospace Technology Center (CTA), covering the development of the Brazilian launching vehicle, which uses solid fuel and is already well-advanced, and also the free launching of scientific satellites of up to 50 kg.

The most important aspect, however, is the "know-how" for liquid fuel propulsion systems, which make it possible to launch more powerful satellites, such as the SO communications type, which carry 4.5 tons to up to 36,000 km away from earth. The solid fuel propulsion launcher which Brazil is planning at the CTA, for example, carries a weight of 200 kg and has a range of only 1,000 km. In order to be able to produce its own rocket for the number 5 and 6 communications satellites by the year 2000, Brazil needs to make an investment estimated at about \$500 million, Iserland said.

Soviet Nuclear Experts To Arrive in November

PY3009004689 Sao Paulo VEJA in Portuguese
27 Sep 89 p 61

[From the "Radar" page]

[Text] If there is one thing upon which the Soviets and the North Americans fully agree it is the need to restrict nuclear proliferation among countries that do not have this technology yet. However, despite this tendency, A.N. Protsenko, Chairman of the State Committee of Utilization of Atomic Energy, will arrive in November within the framework of the series of high-level visits through which the USSR has been courting Brazil, a policy which has the personal support of Mikhail Gorbachev. The Protsenko-led delegation will participate in a seminar organized by the Brazilian Nuclear Energy Association. The seminar will serve to discuss the possible exchange of information and technical cooperation in the nuclear field between Brazil and the Soviet Union.

INTERNATIONAL AFFAIRS

Arab League Discusses Israeli Missile Test

Council Meets in Tunis

LD2509133489 Kuwait KUNA in English
1214 GMT 25 Sep 89

[Text] Tunis, Sept 25 (KUNA)—The Council of the Arab League started here Monday an emergency session to discuss Israel's launching of a missile in the Mediterranean Sea 400 kilometers off the Libyan coast.

Arab League Secretary General Chedli Klibi said at the opening session that the launching of the missile is "the last stage in a series of similar experiments on medium-range ballistic missiles by Israel."

He added that the first experiment was conducted in May of 1987 and the second was in September of last year.

"Israel's determination to upgrade its missiles' capability indicates that the Zionists plan to launch attacks against any Arab target," Klibi speculated.

"What Israel has done on the 14th of this month by launching a nuclear-capable missile is a new evidence on Israel's continued policy of aggression and expansion and its readiness to increase tension in the area," he asserted.

The council will end its meetings later today and will issue a statement indicating what precautions should be taken in such cases.

Tunis Radio Reports Further

LD2509153989 Tunis Domestic Service
in Arabic 1300 GMT 25 Sep 89

[Text] [Announcer] At the request of the Libyan Jamahiriyyah, the Arab League Council held an emergency session this morning to discuss the subject of Israel's firing a medium-range missile, which landed in the Mediterranean Sea 400 km from the city of Benghazi. The session is being chaired by the delegate from Oman, and is attended by Chedli Klibi, secretary-general of the Arab League. Abdelmajid al-Mrasi reports from the Arab League premises:

[Al-Mrasi] Chedli Klibi, secretary-general of the Arab League, opened the session. In his speech he said that the firing of the Israeli missile, Jericho II, which landed near the Libyan coast, was an operational test of a medium-range ballistic missile, and was the last in a series of similar tests of this type of missile. The first of these took place in May 1987 and the second, which was a repeat of a test which took place in May 1988, occurred in September 1988.

Chedli Klibi added: The leaders of the Zionist entity have boasted of their ability to bring death and destruction to any Arab country. They rely first of all on the air

force, secondly on naval raids, thirdly on parachute drops, and on other means of aggression. The Israeli war machine has indeed practiced that, in one way or another, in the depths of Egyptian, Syrian, Lebanese, Jordanian, Iraqi, and Tunisian territories, and it has boasted that its forces can strike at any Arab country. That capability has now become a reality: Israel's reach has now been lengthened and strengthened by these ballistic missiles, which could be used at any time Israel chooses.

The secretary-general of the Arab League said that the responsibility of the states that cooperate with Israel in the military field, foremost among them being the United States whose previous administration was entangled in an open-ended strategic alliance with Israel, cannot be ignored. The U.S. Administration thus finds itself in a contradictory position: on one hand it is concerned to find peaceful solutions to the Arab-Israeli conflict within the framework of international law, and on the other hand it has to give unlimited assistance to a war machine used to violate the values held by the American nation, in accordance with its alliance with Israel. Chedli Klibi concluded his speech by saying that the task in the present situation is to intensify Arab efforts aimed at halting the Zionist entity's strike force, as a temporary measure to prevent dangers and to gradually develop a strong and deterrent national security system. We thank the Jamahiriyyah for drawing the attention of its sister states to the need for this action.

[Announcer] The session concluded its work by making a number of decisions. These will be summarized for us by 'Abdal-'Ati al-'Ubaydi, commissioner general of the Libyan Arab Jamahiriyyah to the Arab League.

[Al-'Ubaydi] The delegates' decisions alert the international community to the danger of this action by the Zionist enemy, which threatens peace and security in the Arab region and in the Mediterranean Sea. It was agreed that the Arab states and the league will follow up this subject at various political levels and during their contacts. I think this is the beginning of following up the subject because the council of the league will, in its forthcoming session in March, certainly address itself to this subject. Also, the Arab states and their delegates [words indistinct] this subject, as it is a problem for the Arab states and [words indistinct].

EGYPT

Paper Criticizes U.S. Silence on Israeli Missile

NC1609220289 Cairo MENA in Arabic 2120 GMT
16 Sep 89

[Text] Cairo, 16 Sep (MENA)—The newspaper AL-AKHBAR comments on Israel's launching of a long-range missile which fell near the Libyan coast the day before yesterday. It says that this is an extremely grave development proving that Israeli officials are continuing the policy of increasing tension in the Middle East at a

time when international efforts are being directed toward establishing peace in the region.

In an editorial in its Sunday edition, AL-AKHBAR denounces the U.S. silence on this dangerous development, especially because of recent U.S. accusations that some Arab countries are trying to produce or acquire long-range missiles.

Commenting on the U.S. stand, AL-AKHBAR asks: What would happen if an Arab country test-fired such a missile? Would the supporters of Tel Aviv be content to remain silent in such a case?

INDIA

Details on Planned Nuclear Reactors, Fueling

Research Director's Speech

51500003 Madras *THE HINDU* in English
9 Sep 89 p 3

[Text] Madras, Sept 8—The Kamini research reactor at Kalpakkam is expected to be commissioned by the end of this year according to Mr C. V. Sundaram, Director, Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam.

Delivering the valedictory address of the workshop on "Futurology" organised by Anna University, he said the Kamini research reactor would be the neutron source for radiography, radiation physics experiments and materials characterisation. It would be entirely fuelled by uranium 233. "We are hopeful that it will be commissioned by the end of this year," he said.

(The IGCAR is setting up this reactor as a first step in harnessing the energy potential in abundant thorium resources in the country and Kamini will operate with fuel derived from thorium. This fuel is a fissionable isotope of uranium, called uranium 233. Like plutonium, this substance does not occur in nature but is produced by the transmutation of natural thorium upon irradiation in a nuclear reactor).

Mr. Sundaram, who stressed the importance of development of nuclear power said even if there was a growth rate of 1.5 to 2 per cent a year, the coal resources in the country would get spent by 2080 A.D. Other fossil fuels also would not last long. The coal was a valuable chemical source and it would be imprudent to burn it. "We should rather husband it for chemical and metallurgical applications." It was in this context that Homi Bhabha thought of developing nuclear power in India.

The country could reasonably achieve 3,50,000 MW of capacity by the early decades of the next century. Of this, the nuclear component could be as high as 1,00,000 MW. This could be achieved by setting up a series of fast breeder reactors (FBR). He pointed out that the country was already aiming at a generation of 10,000 MW through pressurised heavy water reactors by 2000 A.D.

Breeder reactors hold future: "But for future expansion, we have to resort to breeder reactors. The IGCAR has set up a science and technology base for progressive development of FBRs," he said. The Fast Breeder Test Reactor, commissioned in October, 1985 was fuelled with an indigenously developed mixed plutonium-uranium carbide fuel. "We are right now in the processing of raising it to higher power levels. Its small core of mixed carbide fuel will be capable of 10 MW of thermal power. When it could be replaced by a full core, the reactor could produce 40 MW of thermal power viz 10 MW of electrical power."

"This is a small beginning. Side by side, we are designing Prototype Fast Breeder Reactor (PFBR). The confidence-level of the group of scientists at the IGCAR is so high that the design can be totally Indian and the fabrication can also be Indian. It will be set up by 2000 A.D." he said. A reprocessing plant was also coming up at Kalpakkam to build up the need inventory of plutonium. "It will be our ambition" to raise the 10,000 MW of nuclear electricity capacity by 2000 A.D. to 1,00,000 MW from breeder reactors in the first 40 or 50 years of the next century, he said.

When that target of 1,00,000 MW was achieved, it would be a point for deploying thorium breeder reactors, which would produce uranium 233 for fuelling breeder reactors. "We are making a small beginning" with the Kamini research reactor, entirely fuelled by uranium 233, he said.

Fossil fuels depleting: Prof P. Sivalingam, former Vice-Chancellor, Anna University, who presided, said the workshop's theme, "India's future in space, energy and biotechnology" was of vital concern to everybody. There had been a keen awakening on energy options because the fossil fuels such as coal and crude oil would be exhausted in another 100 years. Hence, conservation of energy assumed importance. As much as 25 per cent energy could be saved by setting up combined cycle plants.

Regarding biotechnology, Prof Sivalingam said it had immense possibilities in medicine, agriculture, etc.

Dr S. Sathikh, Dean of Postgraduate Studies, Anna University, welcomed the gathering.

Dr R. Ramaprabhu, coordinator, Futurology workshop, proposed a vote of thanks.

More on Kamini Reactor

51500003 Madras *THE HINDU* in English
28 Aug 89 p 4

[Text] Bombay, Aug 27—The Radiometallurgy Division (RMD) of the Bhabha Atomic Research Centre (BARC) here has successfully fabricated Uranium-233 as a fuel sub-assembly for the research reactor, "Kamini," at the Indira Gandhi Centre for Atomic Research (IGCAR) at Kalpakkam in Tamil Nadu.

Dr C. Ganguly, head of the RMD, said here that Kamini was the first reactor of its kind in the world to use U-233 bearing fuel, which was a milestone in thorium use and development.

U-233, the most efficient fissile material in thermal reactor, is produced from naturally occurring thorium-232 and India has abundant reserves (more than 3.6 lakh tonnes) of it, according to him.

Kamini the 30 kW light water reactor for neutron radiography experiment, is being set up by BARC scientists and engineers and is expected to go critical by the year end.

The Kamini fuel sub-assembly comprises eight fuel plates of aluminum clad Al-U-233 containing approximately 8 gm of U-233 per plate, with nine fuel sub-assemblies forming the core.

Dr Ganguly said the fabrication experience of aluminum-plutonium plate fuel elements formed the basis for the process flowsheet development for the Kamini fuel plates.

Why aluminum was chosen: Aluminum was chosen because of its low parasitic thermal neutron absorption crosssection, low cost, ready availability, easy fabricability, adequate mechanical strength, excellent irradiation behaviour and corrosion resistance in water up to 100° Celsius.

"Handling of U-233 is as difficult as that of plutonium because of the accompanying U-232 which has strong gamma emitting daughter products," the scientist said.

The fuel assemblies are being tested in the "Purnima III" reactor at BARC for conducting preliminary physics experiments and would then be transported by road to IGCAR for loading in the Kamini reactor. For this purpose, a special transportation package called "bird cage", has been designed and fabricated by the RMD.

Pakistan Proposal on Mutual Inspection Said Not Viable

51500004 New Delhi PATRIOT in English
23 Aug 89 p 5

[Text] Pakistan's proposal for mutual inspection of nuclear facilities with India is not viable.

This has been stated in a just-published study titled "India-Pakistan-China: defence and nuclear tangle in South Asia", conducted by Dr Ram Rajan Subramaniam of the Institute for Defence Studies and Analysis (IDSA) in New Delhi, reports UNI.

According to the study, the Pakistan proposal posed considerable procedural difficulties owing to the absence of a supplier and recipient relationship between the two countries.

In the case of a mutual inspection agreement, neither party would have all the knowledge that is necessary, of

the designs of the facilities in the two countries, as there is no supplier-recipient linkage between India and Pakistan.

Stressing that on-site inspection was crucial for verifying data, the study says it thus became necessary to check design information, check material when it arrived, availability of enough 'strategic points' in the facilities where the inspectors had access and to have surprise inspections to ensure that the process of the plant cannot be changed quickly to make weapons, grade uranium.

The study says that in the case of India and Pakistan it appeared difficult to envisage that these conditions could all be met in full.

For instance, surprise inspections would require the establishment of a conducive climate which at present may not necessarily be possible. Besides, the proposal also seemed unviable because the established safeguard procedures of the International Atomic Energy Association (IAEA) of containment, verification and surveillance had been beset with difficulties.

The study cites the example of the base of Pakistan's Karachi nuclear power plant—which houses the natural uranium fueled and heavy water moderator reactor of the 'Candu' design.

The reactor has certain advantages—as have the Indian reactors in Kota, Madras and Trombay—that it need not shut down for the fuel elements to be reloaded.

When Pakistan started manufacturing indigenously unsafeguarded natural uranium nuclear fuel elements in 1981, the possibility developed that an unsafeguarded rod of fuel could be introduced into a safeguarded facility and then irradiated and processed to recover weapons grade plutonium.

Simultaneously, several snags developed in the IAEA safeguards arrangements. The IAEA learnt that Pakistan was building a reprocessing facility using the solvent extraction technique.

The agency took up the matter with Pakistan and expressed its desire to upgrade the safeguards but Pakistan objected to it.

Noting that the inspectors are hard-pressed to prove the absence of a diversion, the study says this incident demonstrated the degree to which inspection authorities depend on the willing cooperation of the State concerned and the difficulties that are likely to be created if cooperation is withheld.

Since India and Pakistan do not as yet have all the designs of each other's facilities, mutual inspection cannot work to the satisfaction of either of the parties.

Such inspection cannot prevent a state from producing plutonium or highly enriched uranium that could be used for weapons as well as for peaceful purposes.

Pakistan has mastered the technology of gaseous centrifuge enrichment at Kahuta. Having agreed to ut Kahuta under bilateral safeguards it may then set out to use its expertise to build a second undeclared centrifuge plant.

The study says Indian inspectors would have no way to knowing about the existence of such a plant. Pakistan too in turn can argue that same about India with regard to its fast breeder and reprocessing technology.

The kind of national technical means of verification and sensors the two superpowers, have, are not available for countries like India and Pakistan. Consequently, there would be pressures on each country to chase every rumour.

A country may attempt to blur the issue by taking steps to ensure that the safeguards do not function effectively by imposing impediments to inspections.

These might be achieved through delays in making available details on processes, destroying records and reports on material accountancy.

AEC Chairman Tells Plans for Nuclear Power Plants

51500002 New Delhi PATRIOT in English
31 Aug 89 p 5

[Text] Cochin, Aug 30 (PTI)—The 2000 MW Soviet-assisted Koodamkulam (Tamilnadu) nuclear power plant, expected to be commissioned by 1998, will cater to the future power requirements of the southern States, mainly Kerala, according to Atomic Energy Commission Chairman M. R. Srinivasan.

Speaking to newsmen here on Tuesday, Dr Srinivasan said there was no possibility of setting up a nuclear power plant within Kerala at present as none of the sites inspected by the selection committee of the Atomic Energy Commission was found to be adequate for the purpose.

However, the Koodamkulam plant, to be located quite close to Kerala, near Nagercoil in Tamilnadu, is expected to solve the power crisis being faced by Kerala in the near future.

Meanwhile, the Atomic Energy Commission would consider setting up of a nuclear power plant in Kerala as and when a suitable site was identified, he added.

Dr Srinivasan said the plant would have the most successful technology vogue in 22 'VVR' reactors in the USSR.

Enriched uranium, the fuel for the plant, would be imported from the Soviet Union and the spent fuel shipped back. The plant would have two pressurised 'VVR reactors', of 1000 MW each, and the cost of power generated from the plant would be on par with that of power from other nuclear power plants in the country.

Meanwhile, he said steps were under way to set up a purely indigenous 1410 MW heavy water nuclear power plant using natural uranium at Kiga in Karnataka.

It would consist of six reactors, of 235 MW each, and was expected to be commissioned sometime between 1995 and 1998.

Referring to the complaints from States like Kerala of inadequate share of power from power plants in neighbouring States, Dr Srinivasan said a National Power Transmission Corporation was being set up to ensure proper distribution of power from power plants situated in different States.

Dr Srinivasan described as 'absurd', the environmentalists' argument that the setting up of the nuclear power plant in Koodamkulam would affect fishing activities in the area. Actually, it would help fishermen living nearby to prosper, with better marketing facilities and other infrastructure coming up as a result of the plant.

He said the site at Koodamkulam was "ideal", and there would virtually be no evacuation problems there.

Editorial Questions Safety of Nuclear Power

51500001 Calcutta THE STATESMAN in English
25 Aug 89 p 6

[Editorial: "An Accident Disclosed"]

[Text] The deep fears of those who opposed nuclear energy, whether for military purposes or for generating electric power, are certain to be reinforced by the recent Soviet disclosure of details relating to a major accident in a military nuclear plant in the town of Kyshtym in the southern Ural mountains. Thought to be perhaps the worst of all accidents in the field of nuclear weapons production, it occurred in 1957 but was not even acknowledged by the Soviet authorities for over 30 years, the only information about it coming from a Soviet biologist who had emigrated. According to him, the accident occurred at a plutonium processing plant, and an area of some 600 sq km was badly affected. But a detailed technical report that Moscow supplied to the International Atomic Energy Agency a few weeks ago—possibly because of the new mood of glasnost prevailing in the USSR or, maybe, in its own interest as it has discovered in the aftermath of the Chernobyl disaster—suggests that nearly 2,700 sq km were so badly affected that it took more than 20 years to bring back under cultivation even a part of the agricultural lands laid waste by the accident. Over 10,000 local residents had to be evacuated from the vicinity, but, according to the report, however, is that radioactive waste was released as a result of the failure of a cooling system from a storage tank containing high level radioactive nitrate acetate waste.

In the light of the information now being disclosed about this incident, as well as about some others, it may be pertinent to ask whether India's arrangements for disposal of radioactive waste are quite safe. It seems, at least to the layman, that the nuclear establishment has been seeking to paint a euphoric picture of virtually unlimited possibilities of power generation by means of nuclear power, in sharp contrast to the limitations of conventional sources of energy. In that process, it may have played down the safety

aspect, though, perhaps, not deliberately. The plan is to set up at least 32 nuclear power reactors so that they are in operation by 2000 A.D., against six at present. All questions regarding safety are met with the stock reply that despite Chernobyl, the Soviet Union is not going to give up nuclear power development; that many countries, both industrialized and developing, are fully committed to the nuclear power programme; and that, in any case, the kind of accidents that occurred elsewhere cannot occur here inasmuch as Indian reactor operators are infinitely more safety-minded and the likelihood of human error is negligible. Also, the question as to how the radioactive waste, from existing reactors as well as those that are planned for the future, will be handled has not been satisfactorily answered so far. The Washington-based Worldwatch Institute cautioned not long ago that in the heady rush to build nuclear power plants, the issue of nuclear waste disposal has been all but ignored. The Atomic Energy Commission needs to assure the public, in the fullest possible detail, that this is not the case with India.

Commentary Lauds Successful Missile Launch

BK2909122989 Delhi General Overseas Service
in English 1010 GMT 29 Sep 89

[Commander Uday Bhasker commentary]

[Text] The successful launch of the surface-to-surface missile, Prithvi, on Wednesday [27 September] is an event that the nation can be justifiably proud of. Prithvi, India's first surface-to-surface missile, SSM, it may be recalled, had been earlier tested in February last year, and this launch differed from the one in last February. This launch may be described as a successful developmental trial and this distinction assumes considerable significance while developing weapons system, more so in the case of missiles. To briefly recapitulate, Prithvi is part of the Defense Research and Development Organization's [DRDO's] integrated guided missile program which incidentally includes the long-range missile Agni that was successfully launched in May this year. In addition to these two missiles, the program also includes surface-to-air missiles, Trishul and Akash, and the antitank missile, Nag, all of which are in different stages of development.

Missiles are generally classified by their maximum range; that is, up to 500 km, they are short-range; 500 to 5,500 km are intermediate-range; and those above 5,500 km are cruise missile. By this token, Prithvi has a potential range of 250 km. It may be recalled [as heard] a short-range surface-to-surface missile, and it can be fired from a surface platform like a land-based missile battery. The single-stage liquid propellant missile is fitted with an advanced strapped-on inertial guidance system which incorporates the latest in control and computer technology.

One of the special features of the Prithvi is the closed-loop guidance system that controls the missile, taking into account the prevailing battle environment and the exact location of the target. This characteristics gives the Prithvi an edge over comparable missiles and the fact

that this has been achieved by the expertise available within the country must be commended.

India, because of its avowed nonaligned stand, has had to more or less go it alone in this field. Thus the integrated guided missile program was launched in 1983, and the achievements in the different types of missiles have been very impressive. India with its successful launches is the only developing nation, apart from China, to demonstrate its indigenous capability in missile technology. Having had to start from scratch almost, the Prithvi launch of February 1988 was an experimental launch. At this stage, India was still proving its ability to master the technology of launching missiles capable vehicles, and this has been then established. [sentence as heard] From the experimental stage, the missile has to move to the developmental stage where all the myriad subsystems have to be integrated in what may be called as the mission role.

Missiles and their proliferation have an interesting history. As it happens, the first military leader to exploit the potential of the rocket, the ancestor of the missile, was none other than Hyder Ali of Mysore [Indian ruler]. He and his son, Tipu Sultan, used metal-clad rockets with telling effects against the British. And from the battle fields of Srirangapatnam, the weapon moved to Europe where it was perfected into today's missile. While the two superpowers have the largest inventory of missiles, what is alarming is that there has been a considerable proliferation of missile among the developing nations of the world.

Due to a variety of compulsions, including the commercial aspect, missile developing nations have eagerly supplied either missiles or its technology to a large number of nations. In the year 1988-89, the outlay on defense R and D [research and development] has been 6,460 million rupees. That is nearly 5 percent of the overall defense budget. Most nations that are missile-capable spend up to 10 percent of their defense budget on R and D, and this makes the achievement of the DRDO all the more laudable. Apart from the DRDO public sector units, the private industry and leading technical institutions have also been involved in the development of the Prithvi. And from February 1988 to today, the indigenous content of the missile and its guidance technology have appreciably increased, thereby making this achievement very significant in moving toward self-reliance.

Defense Ministry Adviser on 'Prithvi' Test Firing

BK2809020589 Delhi Doordarshan Television Network
in English 1600 GMT 27 Sep 89

[Text] The scientific adviser to the defense minister, Dr V.S. Arunachalam, has expressed confidence that the [surface-to-surface] Prithvi [earth] missile system can be handed over to the Army as soon as possible. On his return to New Delhi from Sriharikota, Dr Arunachalam told our correspondent, Prabhakar Rao, that the Army has already placed orders for the Prithvi missile.

[Begin Dr Arunachalam recording] The sky was very cloudy; the missile performed admirably. It followed the

path we set for the missile and reached the target very accurately. This makes us feel very confident about our ability to put these missiles into the hands of our Army and the Air Force as soon as possible. Already, the Army has placed orders for these missiles and we are confident that with this test firing, we will be able to deliver these missiles as soon as possible. [end recording]

The prime minister, Mr Rajiv Gandhi, has congratulated the scientists and others associated with the successful second launch of Prithvi. A similar congratulatory message has also been issued by the defense minister, Mr K.C. Pant.

Another Missile Successfully Launched 27 Sep

*BK2709075089 Delhi Domestic Service in English
0730 GMT 27 Sep 89*

[Text] India today had another successful launch of the surface-to-surface missile Prithvi [Earth]. The launch was carried out this morning and the missile followed the pre-planned track accurately before impacting in the Bay of Bengal.

Dr V.S. Arunchalam, the scientific adviser to the defense minister, said that the firing of the Prithvi represents an important milestone in ensuring the reliability of the system and also in the defining and accurately controlling the trajectory needed for some of the weapons payloads designated for this missile.

Prithvi had its maiden successful launch in February last year. Along with the recently-launched intermediate-range missile Agni [Fire], it formed the core of the achievement of the defense scientists under the integrated guided missile development program. The Prithvi is indigenously made and designed at the Defense Research and Development Organization. The effectiveness of the Prithvi system has once again been proved and the country's self-reliance in defense preparedness has got a further boost.

Government Plans Another Prithvi Test Launch

*BK2909130989 Delhi Domestic Service in English
1230 GMT 29 Sep 89*

[Text] The government is planning another test launch of Prithvi [surface-to-surface missile] next month. The Defense Research and Development Organization is planning more such launches this year to test the efficiency of the weapon delivery system. Experiments will be conducted in different ranges of the country to evaluate their performances. This information was given to the members of the consultative committee attached to the Defense Ministry in New Delhi today.

Gandhi Opens Nuclear Plant in Uttar Pradesh

*BK1510155989 Delhi Domestic Service in English
1530 GMT 15 Oct 89*

[Excerpt] The prime minister, Mr Rajiv Gandhi, today dedicated to the nation the Narora atomic power station.

Situated in the Bulandshahr District of Uttar Pradesh, the plant will generate and supply electricity to the grid. It has two units with a capacity of 235 mw each.

Mr Gandhi also laid the foundation of the 1,340 crore rupee petrochemical project at Salimpur in Aligarh District. The Uttar Pradesh chief minister, Mr N.D. Tiwari, was present on the occasion.

In the morning, Mr Gandhi laid the foundation stone of the 2,400 crore rupee Haldia petrochemical complex in West Bengal. [passage omitted]

IAEA Safeguards To Apply to French Nuclear Fuel

*BK1210091089 Delhi Domestic Service in English
0730 GMT 12 Oct 89*

[Text] India has signed an agreement with the International Atomic Energy Agency, IAEA, for the application of safeguards of nuclear materials to be supplied by France. The agreement paves the way for shipment of natural uranium pellets from France to India to fuel the Rajasthan nuclear power station. The Indian ambassador to Austria, Mr Sinai, and the IAEA director general, Dr Hans Blix, signed the agreement in Vienna yesterday.

Public Sector Producing Space, Nuclear Equipment

*BK0810125789 Delhi Domestic Service
in English 1230 GMT 8 Oct 89*

[Text] The public sector Bharat Heavy Plates and Vessels Ltd achieved a record turnover of over 140 crore rupees during 1988-89. The Vishakhapatnam-based company has been producing sophisticated equipment ranging from large space simulation chambers for the Indian Space Research Organization and heavy water heat exchangers for the Nuclear Power Corporation.

Uranium Production at 'All-Time High' in 1988-89

*BK3009092989 Delhi Domestic Service in English
0830 GMT 30 Sep 89*

[Text] The production of uranium was at an all-time high in the country in the year 1988-89. The chairman of the Uranium Corporation of India, Mr M.K. Batra, said in Bombay that the corporation achieved production worth over 33 crore rupees during this period.

IRAN

Iraqi Effort To Get Nuclear Missiles Viewed

*NC1809171589 Tehran TEHRAN TIMES in English
14 Sep 89 p 2*

[Editorial: "A Dangerous Arms Race in the Middle East"]

[Text] Generating unhealthy fears of war when nations can better devote attention to economic and spiritual regeneration of their nations is perhaps one of the sordid tactics of dictators and those who wish to hold on to political power against the wishes of their people. This it appears can be the only motive behind much publicized revelations that the Iraqi regime in collaboration with Egypt and Argentina is at developing the Condor II missiles with an estimated range of 1,000 kilometers (600 miles).

The Argentine president confirming the military reports has even gone so far as to say that he will not be deterred by superpower pressures to stop such collaboration. But much as we appreciate the need for economically strapped Argentina's need to replenish its coffers, the president should think in terms of the dangerous consequences of setting off an arms race in this region.

A cause for even more concern is the report that Baghdad which has made no secret of its chemical arms production—or rather the fact that the secret came to light when a big chemical bomb plant caught fire in Iraq recently killing several—is now busy trying to gain access to missiles carrying nuclear warheads. It appears that Baghdad has multiplied its efforts since the August 20, 1988 ceasefire called by the United Nations. Iraq is evading pursuit of real peace, appearing to want it so and on the other hand escalating a dangerous arms race.

The possible access of the Iraqis to nuclear warheads will only lead to a new phase of crisis and tensions in the region and there can be no saying what will happen in the future. All it will do is take any moves in pursuit of peace further and further away. And if this is not to be, then the world bodies will have to step in and stop the rot that is beginning to set in so that it will not have more far-reaching consequences.

With Iraq's past record of nefarious use of chemical bombs at Halabjah, who can guarantee that this regime is not doing all that it is at now to undermine regional peace and play the gendarme of the region.

If the world keeps silent and does nothing, then it should not hold the Islamic Republic of Iran to blame if it too begins to think in terms of building up an arsenal for defensive purposes against covert threats of this nature. However, what Iran now is endeavoring honestly to do is to develop its nuclear energy for peaceful purposes through technology and help provided by the Soviet Union in pursuance of the friendly relations that have been struck between the two neighboring countries.

All in all, however, the Middle Eastern arms race seems to be rolling along with a momentum of its own and will in all probability not stop through urgings of a friendly nature. So Iran would have to take note of the underlying dangers and deal with them in as serious and realistic a manner as such diabolic dangers merit.

Atomic Energy Official on Exporting Uranium

NC1509221389 Tehran RESALAT in Persian
10 Sep 89 p 7

[From the Economics Desk]

[Text] There are only 10 countries in the world that have high-grade uranium and we are one of them.

According to the RESALAT correspondent this was said by Dr Amrollahi, head of Iran's Atomic Energy Organization, in an interview with the nuclear energy publication [not further specified]. He added: We are currently prospecting for uranium in Saghand, Yazd. This has been going on for the past 5 years and, God willing, we are on our way to exploiting this mine.

He said: The Saghand mine is one of our country's largest uranium mines. It is not possible to disclose exact figures on its reserves at this time because whatever estimate we provide may be an anomaly [preceding word in English], and the reserves may be much greater.

Dr Amrollahi added: It is a source of pride for us today that the Saghand mine is one of the world's largest uranium mines. As to when the mine will become operational and whether this uranium mine is similar to others or requires any special procedures, he said: One kg of uranium sells for \$30 to \$100 on the international market today. Our mine, with an estimated 5,000 tons of uranium, is obviously a source of great income.

He continued: I hope that with this uranium we will be able to develop our nuclear energy industry and become a major exporter as well.

Regarding Iran's international uranium standing Dr Amrollahi said: At present no specific ranking has taken place but we can claim that we are 1 of 10 countries that have high-grade uranium.

When asked whether ample uranium reserves are present in other areas he said: We have resources in the cities of Esfahan, Azerbaijan, Khorasan, and Sistan va Baluchestan, but none of these can compare with the Yazd reserves.

Uranium Bullion Plant To Be Set Up in Yazd

LD1110093989 Tehran Television Service
in Persian 1600 GMT 10 Oct 89

[Text] Work relating to statistical research and the analysis of samples of uranium ores—in the region as large as 2,500 hectares in the uranium mine of Saghand, near Yazd—has been completed. The findings have been compiled in order to be included in calculations for the country's first 5-year plan. Our correspondent reports from Yazd:

Following the identification of the region measuring 2,500 square meters—uranium mines situated in the Saghand region, northeast Yazd—statistical research

and the analysis of uranium ore samples of 2,500 hectares of those mines were completed. The findings were compiled in order to be included in projections made for the first 5-year plan. The Central News Unit reports that Mr Amrollahi, deputy president and head of the Atomic Energy Organization, who has travelled to Yazd, said in the interview: Through systematic work during the next 2 years, a plant to produce refined uranium will be set up in Yazd Province which will employ 800 people. He added: Through sampling and analysis of the findings, work on analysis of two masses of uranium ores has been completed. Further work is being carried out on eight more masses which possess high levels of uranium.

Missile Production With PRC Discussed

JN1909203989 Abu Dhabi AL-ITTIHAD in Arabic
18 Sep 89 p 1

[Text] Special military sources have told AL-ITTIHAD that Iran is currently holding discussions with the PRC on joint production of the M9-11 surface-to-surface missile series, which has a range of 300 to 450 km. The sources disclosed that Iran is currently producing a new ballistic missile named Iran-130, similar in capability to the Soviet SCUD-B missile. Iran is currently producing a family of unguided surface-to-surface missiles including the "Iqab," which has a range of 45 km and is derived from the Chinese Type-83 missiles; "Nazi'at," with a range of 90 km; and "Shahen," with a range of 20 km.

ISRAEL

Paper Says No Apology Needed for Missile Launch

TA1909154189 Tel Aviv HA'ARETZ in Hebrew
19 Sep 89 p 13

[Commentary by Ze'ev Schiff: "No Need To Apologize"]

[Excerpts] The recent Soviet announcement alleging that Israel test fired a missile at a distance of 1,300 km into the Mediterranean Sea stands out from similar reports in the past. Prior to the launch of the Israeli satellite, reports would occasionally appear in various magazines throughout the world saying that Israel had developed and tested a surface-to-surface missile with a range of over 1,000 km. [passage omitted]

The proliferation of surface-to-surface missiles in the Middle East featured prominently in talks between Moscow and Washington, and was discussed in Moscow by American and Soviet military experts as early as the end of last year. The Americans were trying to persuade the Russians of the need to prevent the sale of advanced technology in missile manufacturing, and told the Russians that this was important because the territory of the Soviet Union comes within missile range of Middle East countries.

The two superpowers, however, realized this fact too late, and in fact have lost control of the situation. At

most, they can only slow the pace of missile development, or perhaps influence the orientation of this development (such as the range of the missiles). They cannot, however, prevent the process.

Ironically enough, this loss of control took place after the two superpowers signed the INF agreement.

Perhaps this is why Moscow refuses to supply medium-range SS-23's to Syria and Iraq, in spite of the fact that it was Moscow, more than anybody else, that promoted the missile race in the Middle East by supplying FROG's and SCUD's to almost every Arab country. The United States supplied Israel only with the Lance, a tactical-range missile.

The United States and the Soviet Union are no longer the only players on the stage; they have been joined by other missile manufacturers: the PRC, Argentina, Brazil, and Pakistan. [passage omitted]

Therefore, if we are to believe foreign publications, several countries already possess missiles capable of reaching the southern boundaries of the Soviet Union. Moscow complains about Israel; but what about Saudi Arabia and its Chinese missiles (with a range of 3,000 km), and Iraq which has increased the range of its Soviet missiles and claims to have a missile with a range of 900 km? Israel need not apologize in the face of the arms race raging around it, nor view itself as a criminal for having launched a satellite into space. This is our right. In view of the present situation, a space satellite can be considered necessary, and if a peace agreement is ever signed between Israel and the Arab countries resulting in territorial concessions, this satellite could be an important monitoring tool in preventing surprises.

For this reason the Israeli reaction to the Soviet allegation was unsatisfactory. Israel should have said "no comment" rather than give the impression of apologizing or playing dumb, as if we had been caught with our pants down. Any child will tell you that if Israel can launch a satellite into space it can also fire long-range missiles. If the Soviet Union is troubled, the practical thing for it to do is to address its concerns to Jerusalem rather than to Washington. Moreover, if foreign publications are reporting the truth, there may be something to talk about.

According to the latest publications, Israel should also be interested in having Moscow discuss problems with Jerusalem rather than "pay" Washington for this service.

IAI Denies Ballistic Missile Failed

TA2209084889 Jerusalem THE JERUSALEM POST
in English 22 Sep 89 p 16

[Report by Judy Maltz]

[Text] A spokeswoman for Israel Aircraft Industries yesterday denied a report published in JANE'S DEFENCE WEEKLY, according to which a ballistic missile reported to have fallen in the Mediterranean last

week was more likely the failed second stage of an Israeli satellite launch, Ofek-2. She said, "We know absolutely nothing about this."

Argentine President Discusses C-2000 Missiles

TA2709064889 *Jerusalem Domestic Service in Hebrew*
0505 GMT 27 Sep 89

[Report on interview with Argentine President Carlos Menem by 'Oded Ben-'Ami in New York on 26 September—recorded]

[Text] Foreign Minister Moshe Arens last night met with Argentine President Carlos Menem. After the meeting we asked the Argentine president about his country's cooperation with Iraq and Syria in the development of the Condor C-2000 missile. This was his reply:

There is nothing serious in this report. Argentina does all that it can for peace. It is not trying to sell weapons to any country in the world. It is not trying to sell weapons to the Arab world, although the Argentine Pampas fighter plane has been displayed in Israel with the intention of selling it. It is a fighter plane and we have no difficulty in selling to Israel. Nonetheless, promoting war is not our intention. We are dealing with ways to bring about peace. Furthermore, the Arab countries and Israel, which do not manufacture weapons, are buying in Britain, France, and Brazil. Argentina wants to enter this market.

President Menem offers his service as a middleman between Israel and the other parties involved in the Middle East dispute. He is interested in launching a dialogue to resolve the basic problems in the area. He is willing to create a calmer atmosphere, and he believes there are many ways to do so. For this purpose, President Menem intends to come to the Middle East and become the first Argentine president to visit Israel. Relations between Israel and Argentina are good, but they can be improved. That is why I plan to arrive in Israel early next year, Menem said.

KUWAIT

U.S. 'Connivance' in Israeli Missile Test

LD1709092289 *Kuwait KUNA in English* 0811 GMT
17 Sep 89

[Text] Kuwait, Sep 17 (KUNA)—A local daily Sunday charged the U.S. of "connivance" for keeping silent about the newly tested Israeli ballistic missile.

KUWAIT TIMES said that Washington had expressed grave concern over the presence of less advanced missiles in the hands of a number of Arab countries but when it came to Israel no word was (?issued).

The English-language paper emphasized that "Israel's military might derives directly from the U.S.-Israeli strategic cooperation."

The daily said that "purpose of this cooperation" is not difficult to explain, adding that Israel was, has been, and remains America's strategic outpost in the Middle East."

KUWAIT TIMES, however, noted that if the Soviet Union remained silent nobody would have known of the test firing and cautioned, in this respect, that such a situation "speaks of a serious lapse in the Arab world's collective security, if not defense strategy."

Inspection of Israeli Nuclear Plants Urged

LD2809212189 *Kuwait KUNA in English*
1847 GMT 28 Sep 89

[Text] Vienna, Sept 26 (KUNA)—Kuwait Thursday appealed on world countries, particularly the major powers which take responsibility for maintaining world peace and security, to pressure Israel into heeding international calls by opening its nuclear facilities to inspection and supervision of the International Atomic Energy Agency (IAEA).

Addressing the general conference of the Vienna-based U.N. organisation, Kuwait's delegate 'Ali al-Sa'id today underlined world anxiety over Israel's adamant rejection to put its nuclear installations under the agency's supervision and inspection, pointing out the dangers posed by Israel's nuclear potentials to international peace and security.

The Kuwaiti delegate also criticized the report submitted by the IAEA's Director-General Hans Blix on Israel's nuclear power and the threat thereof to the Middle East area, describing the report as 'generalized, vague and does not meet the vital need to expose Israel's real nuclear capabilities and the danger they pose to peace in the area.'

Al-Sa'id also protested mentioning of Kuwait next to Israel on the director-general's report, saying 'we are astonished that the director-general has linked Kuwait to Israel. Kuwait, as is known to all, has no nuclear activity and does not contemplate at present the use of nuclear energy. Therefore, the said report should have rather concentrated on Israel which constitutes an increasing menace to security in the area.'

The delegate defended the lawful right of the Palestinian state to take part in the agency's activities as observer, indicating to the wide world recognition received by the state of Palestine, which, he stressed, should have the right of observer status to participate in the agency's scientific and technical deliberations, board of governors and general conferences.

Kuwait also demanded more representation for Africa, the Middle East and South Asia regions on the agency's board, complaining that the present representation is neither adequate nor balanced.

The delegate renewed Kuwait's support to efforts by the agency aimed at expanded use of nuclear energy for

peaceful purposes and pointed out to Kuwait's contribution to financing of technical projects in some countries in collaboration with the IAEA as well as cooperation with the agency in nuclear medicine, saying the Kuwait centre for isotopes receives trainees sent by the agency. Kuwait, he said, shares with world nations their concern at environmental pollution as result of increased emission of chlorofluorocarbons and deforestation and calls for expanded use of nuclear energy for peaceful purposes, the delegate concluded.

LIBYA

Letter Sent to UN on Israeli Missile Firing

LD2109191289 Tripoli JANA in English
1640 GMT 21 Sep 89

[Text] Tripoli, Al-Fatih 21, [September] JAMAHIRIYAH NEWS AGENCY—Engineer Jadallah 'Azzuz al-Talhi the secretary of the People's Committee for Foreign Liaison and International Cooperation Bureau addressed a letter to both the secretary-general of the United Nations and to the chairman of the U.N. Security Council on the firing by the Zionist enemy of a medium-range missile capable of carrying nuclear warheads which fell into the Mediterranean Sea waters 400 kilometres north of Benghazi.

In the letter, he said:

I would like to point to what the media have been reporting on the Zionist enemy's firing on 14/9/1989 of a medium-range missile capable of carrying nuclear warheads which had fallen into the waters of the Mediterranean Sea 400 kilometers north of the city of Benghazi in great Jamahiriya. In response to such escalation, the great Socialist Libyan Arab People's Jamahiriya would like to assert the following:

This incident represents a serious and new escalation of tension in the Mediterranean Sea region, for apart from it endangers the security and the safety of air and sea navigation and all other economic activities in such sensitive region, it is considered as an undermining to the efforts of the states in the region, and in particular to the member states of the Non-Aligned Movement, aimed at enhancing security and cooperation in this region to turn it into a lagoon of peace.

What had the Zionist entity done comes within the framework of its nuclear capability, challenging by that the will of the international community represented in the related resolutions adopted by the U.N. General Assembly, the U.N. Security Council and the International Agency for Nuclear Energy, all of which denouncing the continued rejection by the Zionist entity to abide by not manufacturing nuclear weapons or acquiring them apart from its refusal to submit its nuclear plant to the inspection by the International Agency for Nuclear Energy.

Such irresponsible acts, which expose world peace and security to a real danger, would have not continued if it were not for the unlimited backing and support the Zionist entity from big states linked with it. By cooperation agreement in this field.

As a result of that, the great Socialist Libyan Arab People's Jamahiriya would like to draw the attention of the international community once more to the grave consequences that may arise from such practices and calls upon all states to refrain from backing and supporting the Zionist entity urging them all to bear their responsibilities and commitments to preserving world peace and security.

Your excellency, please accept my highest appreciations.

The secretary of the People's Bureau for Foreign Liaison and International Cooperation asked that this letter be considered as one of the documents of both the U.N. General Assembly and Security Council.

JANA Editor Criticizes Report on Missile

LD1010090889 Tripoli Voice of Greater Arab
Homeland in Arabic 0015 GMT 10 Oct 89

[Text] The British newspaper THE SUNDAY CORRESPONDENT has carried a report by four journalists that Libya is developing a plastic missile which would strengthen Libya's offensive capability. The paper quotes U.S. intelligence sources as saying that the range of the missile exceeds 600 km, noting that this range enables Libya to strike a number of targets in the Mediterranean such as the NATO air base in Sicily.

The paper says the missile can carry chemical weapons and notes that Libya has been trying for some time to expand its military power. It adds that in an effort to complete the project Libya has tried to buy components of the guidance system for the U.S. Nike-Hercules surface-to-air missile with a view to fitting new warheads to the missile. It said Al-Qadhafi's goal is to build a missile with a range of 1,600 km which could reach occupied Palestine, and notes that the U.S. is worried about this Libyan program.

JANA's international affairs editor has commented on the British newspaper's article, which was also carried by the Western media. He said that no one can be unaware that there is a Western plot to halt any Arab progress, especially in the military sphere or anywhere where Western interests are threatened or where the Zionist enemy in occupied Palestine is threatened. Therefore we are not surprised to hear these voices from time to time reiterating the Zionist tune warning against the danger of Arab military progress and the danger it poses to the interests of the West and world peace.

The editor affirmed that the Western media, which compete in publishing anything about the development of the Arab military industry, willfully maintain silence about the Zionists arsenal which contains the most

dangerous and deadly weapons of destruction ever achieved by the West, beginning with chemical weapons and ending with nuclear bombs and not forgetting the various other weapons.

The editor recalled that the most recent attempt by the Zionists to develop weapons which threaten Arab security and endanger the Arab future was the test of a medium-range missile by the Zionists last month. The missile landed north of Banghazi. The editor explained that these attempts by the Zionists have serious significance and meaning particularly when they underline that all the Arab countries have become the strategic target of the expansionist Zionist plans.

JANA's international affairs editor explained that the US, which, according to the British paper, expressed concern about the development of the Libyan missile, signed a strategic cooperation agreement with the Zionist enemy which guarantees the Zionists full benefit from the development of U.S. weapons and opens the U.S. arms market to Zionist ambitions.

The editor noted that the Western media hushes up the crimes committed by the Zionists against the Palestinian people, crimes which surpass all the crimes against humanity that have been recorded by history. He said the reason for this silence and indifference cannot be innocence or goodwill toward the Arabs.

The editor concluded by saying it is high time that the West, which for the last 40 years has viewed events with only one eye—the Zionist eye—and speaks with one voice—the Zionist voice—to open its other eye to see the truth in full, the truth that will one day assert itself no matter how much the West tries to avoid it or overlook it.

PAKISTAN

Scientist Envisions Nuclear Plant by Early 1990's

BK0710034589 Karachi DAWN in English
24 Sep 89 p 10

[Text] Lahore, Sept 23: Pakistan hopes to build a nuclear power plant by early 1990s and establish higher capacity plants by the turn of the century, Director, Pakistan Institute of Nuclear Science and Technology (PINSTECH) Dr Iqbal H. Qureshi, said on Saturday.

If the Pakistan Atomic Energy Commission (PAEC) plans materialised, he said, nuclear power would meet about 20 per cent of the national power requirements by the year 2,000 against the existing rate of one to two per cent.

Dr Qureshi was delivering the inaugural address at a three-day National Executive Management Seminar on Industrial Radiotracer Applications at the Institute of Nuclear Medicines and Oncology (INMOL), jointly organised by the PAEC, the Australian Nuclear Science and Technology Organisation and the Regional Cooperation Agreement (RCA).

Pakistan, he said, was ready to share its experience with member of the Regional Cooperation Agreement in a number of area of nuclear technology. Pakistan believed that nuclear energy should be used for peaceful purposes, specially in the fields of power generation, agriculture, medicine and industry so that people could reap the economic and technical benefits resulting from the research and development in these fields. He recalled the progress made by the PAEC in all these fields and the assistance it was rendering to the people.

The commission, Dr Qureshi said, was planning to set up an independent centre for the industrial applications of radiation technology for which he hoped the RCA countries would extend full cooperation. In addition, he added, the activities of Radiation and Isotope Applications Division at PINSTECH would be expanded and strengthened.

Although the Commission had the facilities and capability to help the industry in a number of fields, he pointed out, industrialists were not forthcoming, probably because they did not like to make investments unless fully confident of profits. The Commission, he said, was augmenting its efforts in this area to persuade the industrialists to adopt new technologies.

Dr. N.M. Butt, Associate Director, PINSTECH, offered all cooperation and guidance to the industry for incorporating radioisotope gadgets.

Regarding the problems in the way of adopting a new approach in this fields, he said, PINSTECH would also help solve these problems and remove obstacles. "Our scientists at PINSTECH have also performed a large number of field studies in hydrology involving the use of radiotracers, and it would be a pleasure to share our experience with the delegates", Dr Butt said.

The PINSTECH, he said, would also welcome requests from industries and departments for advice and help on the applications of radiotracer, non-destructive testing techniques and analytical measurements.

Dr John F. Easey, Principal Scientist, Australian Nuclear Science and Technology Organisation, said his country stood for transfer of technology and full cooperation in the RCA. That, he added, would strengthen the body by bringing the people closer on equal footing.

Energy Chief on 'Peaceful' Use of Atomic Energy

BK1610113789 Islamabad Domestic Service in English
1100 GMT 16 Oct 89

[Text] Pakistan is fully committed to the promotion of peaceful uses of atomic energy and wants to bring its benefits to the people in the production of electricity and application in agriculture, industry, and medicine. This was stated by the chairman, Pakistan Atomic Energy Commission, while inaugurating a 12-day regional training course on radio therapy for medical physicists in Lahore today. He said Pakistan has placed special

emphasis on applying nuclear radiation in health sector and is among the leading countries in the Third World in using radio isotopes and radiation in this sphere.

'Vigorous' Nuclear Energy Program Planned

BK2709132589 Islamabad Domestic Service in English 1300 GMT 27 Sep 89

[Text] The government has decided to launch a vigorous program for the introduction of nuclear power in the country. This was stated by the chairman, Pakistani Atomic Energy Commission, Mr Munir Ahmed, while speaking on Pakistan's nuclear policy and programs at the annual general conference of the International Atomic Energy Agency in Vienna yesterday.

Reiterating Pakistan's full commitment to the peaceful use of nuclear energy and elimination of all nuclear weapons, he said nuclear power represents a real hope of clean, safe, competitive, and inexhaustible energy option for developing countries. He said to deny them nuclear power in the name of nonproliferation and force them to use fossil fuels is to invite environmental disaster. He said in order to meet the growing needs of Pakistan's energy requirements, they [Pakistan] would seek cooperation of other countries for building nuclear power plants, finally developing indigenous capability in their designing and construction to achieve greater self-reliance.

Opposition Leader Urges Government To Go Nuclear

BK2109103989 Karachi DAWN in English 11 Sep 89 p 5

[Excerpt] Lahore, Sept 10—Maulana Shah Ahmed Noorani, president, JUP [Jamiat-i-Ulema-i-Pakistan], advised the government on Sunday [10 September] to go ahead with its nuclear programme to develop nuclear weapons for bolstering its defence irrespective of hostile reaction by India or any other country.

"If there can be an Israeli bomb, an Indian bomb or a South African bomb than there was no harm in developing an Islamic bomb", he said while addressing the Lahore High Court Bar.

Central JUP leaders, including Maulana Abdus Sattar Khan Niazi, Gen (Retd) K.M. Azhar, Maj Gen (Retd) Muhammad Husain Ansari and Pri Ijaz Hashmi were also present.

The JUP president said that Pakistan should not adopt an apologetic attitude and instead continue its nuclear programme at all costs including foreign assistance, he emphasised.

India, he said, would never accept Pakistan as a reality and thus there could be no compromise with it.

Pakistan should employ all available means to regain Siachen glacier and the occupied Jammu and Kashmir from Indian control, he added. [passage omitted]

SYRIA

Nuclear Research Efforts Described by Israeli Paper

TA1709152389 Tel Aviv MA'ARIV in Hebrew 17 Sep 89 p A6

[Report by 'Imanu'el Rosen]

[Text] "The Syrians have begun research and development in microelectronics, chemistry, and nuclear energy in the past year," according to an article published by the research department of RAFAEL, the Armaments Development Authority.

According to the article, "Syria is investing huge efforts in nuclear research and development. On an investment of \$3.6 billion, it plans to build no fewer than six nuclear power reactors with a total output of 6,000 megawatts."

The report said that the Syrian Atomic Energy Commission, which was set up in 1976, is negotiating with Belgium and Switzerland on the planning and construction of a nuclear power plant. The plant will be built by the Belgians and begin operating in the second half of the 1990's.

The Syrians are simultaneously active in setting up nuclear research reactors with the aid of the Russians and Italians, and have lately begun to conduct surveys to decide on locations.

There is deep concern in Israel in view of Syria's advancement in this field, and the author of the article writes: "At the same time as Israel is drastically cutting budgets for research and development and higher education, Arab countries are investing enormous efforts to advance their science and technology."

Soviet Union Supplying 'Sophisticated' Missiles

LD1509103589 Kuwait KUNA in Arabic 0942 GMT 15 Sep 89

[Text] Kuwait, 15 Sep (KUNA)—The Kuwaiti daily AL-QABAS reports today that Syria has received "very sophisticated" missiles from the Soviet Union. The report says that Syria had persistently demanded the missiles during Soviet Defense Minister General Dmitriy Yazov's visit to Damascus last March.

The daily attributed the report to some "well informed" Eastern sources in Beirut. It did not give any details about the aforementioned missiles, but it did add that a Soviet Army artillery and missile unit commander's recent visit to Syria was "very important" and had "some (?working) and unusual aspects."

Nuclear Power Station Causes Controversy

LD0810214189

[Editorial Report] Moscow Television Service in Russian at 1530 GMT on 8 October carries a 3-minute correspondent's report on the controversy over plans to build a nuclear power station in Chelyabinsk Oblast, southern Urals. He says: "This is how the building site for the southern Urals Nuclear Electric Power Station [AES] looks today. To date, expenditure on design work, preparation of the site and the creation of a building industry base comes to R 250 million. The draft was sent for analysis by an independent expert commission at the USSR State Committee for the Protection of nature. The commission failed to find any defects in the draft, and unambiguously supported construction of the station. Nevertheless, a decision was taken not to resume construction of the AES without the agreement of the inhabitants of the region. And how many months passions have been raging now! Finding themselves at a nuclear crossroads, the people of Chelyabinsk don't want to make a mistake. At large meetings, in local radio and television broadcasts, and on the pages of the newspapers, everyone who wants voices his views—from pioneers to pensioners. A collection of signatures opposing construction of the AES is under way. Unfortunately, they don't want to listen to the voice of the nuclear specialists, and they reject all of their arguments in advance."

Video shows shots of the building site, some of the buildings in a state of semiconstruction, moving on to a meeting of the expert commission, then public meetings, and collection of signatures. The correspondent goes on to interview Yu. Ye. Tarasov, director of the southern Urals AES, who outlines his main arguments in favor of construction of the AES: Covering the energy deficit in the Urals region, supplying clean energy to the metallurgy industry of the region, ecological conservation of reservoirs. He goes on: "Among specialists and even among those who oppose nuclear power, there is overall agreement that there is no alternative to nuclear power; it is only a question of when it is introduced, this century, next century. So as to increase nuclear fuel, its resources, we need to build fast breeder reactors. This is a safer reactor, it is now recognized as a reactor with enhanced safety. It has four protective barriers, although all preceding stations had three protective barriers, both in our country and abroad."

He concludes by giving his views on the referendum, noting the need for informed opinion, and the need for specialists to handle technical questions. Video shows interview in office, and behind the director a plan of the future AES. Over closing video of a model of the station and of the building site, the correspondent notes the need for precise information and a careful examination of all of the arguments before making a final decision.

Crimean Soviet Adopts Halt to AES FinancingPM0410090589 Moscow IZVESTIYA in Russian
3 Oct 89 Morning Edition p 2

[Stepan Troyan reports from Simferopol under general rubric "Direct Line. Own Correspondents at the Teleprinter": "Nuclear Electric Power Station Funding Suspended"]

[Text] The question of whether the Crimean nuclear power station [AES] is to be or is not to be has been debated for several months now. However, time is passing and no decision has been taken.

Now the Crimean Oblast Soviet of People's Deputies, discussing a report of its Executive Committee, has adopted a document which could be summed up as follows: The Crimean branch of the USSR Bank for Industrial Construction has been instructed to stop financing the construction of the AES now being built on the territory of an all-union sanatorium.

V. Kurashik, first deputy chairman of the Crimean Oblast Soviet Executive Committee [oblispolkom], commented the soviet's decision as follows:

Countless meetings, rallies, and demonstrations have been held in the Crimea of late at which demands to suspend the project have been heard again and again. There have even been calls for extreme measures—strikes, to be specific—although everyone understands that we are not prosperous enough to be able to afford such steps.... On the day of the oblast soviet session posters and banners were erected in front of the building demanding an answer to the question: What is going to happen about the AES? Someone put about the rumor that "fuel" had already been delivered to the station. I can state emphatically that nuclear fuel has not been delivered to the Shchelkino settlement. The Crimean branch of the Bank for Industrial Construction has been told not to settle accounts for the delivery of fuel. Now V. Baranovskiy, USSR people's deputy and chairman of the oblast veterans' council, and A. Sergeyev, an oblast soviet deputy and a welder at the Feodosiya machine building plant, have proposed that funding of the dangerous construction project be suspended.

A cable to this effect has been dispatched to the country's government. The final decision on the fate of the Crimean AES will be taken by the USSR Council of Ministers.

'Concern' Expressed Over Israeli Missile TestLD1509130389 Moscow TASS International
Service in Russian 1216 GMT 15 Sep 89

[Text] Moscow, 15 Sep (TASS)—The USSR is seriously concerned at the fact that Israel has carried out a new test launch of a ballistic missile which, according to a report from the USSR Ministry of Defense, has, this time around, been carried out with the range of 1,300 km.

Gennadiy Gerasimov, head of the USSR Foreign Ministry's Information Directorate, stated this at a briefing held here today.

This concern, he noted, is caused by a number of reasons. In the first place, this test was carried out at a time when the USSR and the United States, implementing the INF Treaty, are completely eliminating their missiles of this class. Moreover, they have pledged never to resume their production. This measure radically reduces the danger of escalation of a possible military conflict. Israel's actions, however, are directed in an altogether different direction.

In the second place the international community is currently making efforts to avert the proliferation of the technology for manufacturing ballistic missiles which is dangerous to peace and to conclude a relevant agreement on this score.

Israel, however, does not wish to take account of the views of the majority of countries, either of the East or the West.

In the third place it is well known that Israel has at its disposal the necessary technical resources for the creation of nuclear weapons. According to United Nations data, Gennadiy Gerasimov recalled, this country already has at its disposal a certain reserve of nuclear devices. The availability of delivery vehicles in combination with nuclear charges makes Israel a seat of destabilization which goes far beyond the confines of the Near East region. It cannot be ruled out, the USSR Foreign Ministry spokesman stressed, that this could serve as a complicating factor on the road to an all-encompassing Near East settlement and to the conversion of the Near East and the entire Mediterranean region into a zone of stable peace and cooperation.

EUROPEAN AFFAIRS

Proliferation of Technology to Iraq Examined

51003036 Rome LA REPUBBLICA in Italian
16 Sep 89 p 10

[Article by Arturo Zampaglione: "Western Nuclear Weapons For Baghdad. Supermissiles With Atlanta Money."]

[Text] New York—There is a man in Atlanta who more than anyone else knows the route that nuclear weapons and ballistic missiles have taken from the American branch of the Banca Nazionale del Lavoro to Iraq. This route ties together a great many financial centers and industries spread throughout the world, and eventually arrives in Baghdad. That man is Robert Laurence Barr, Jr., Bob to his friends, and for the last 3 years district attorney of northern Georgia.

Barr has been working all summer on the BNL-Atlanta case. Unleashing his agents, he had his inspectors go through every single document found in the branch and interrogated ex-director Chris Drogoul and his accomplices for hours. The district attorney enjoys these investigations. He was not even 22 years old when, in 1970, right out of the University of California with a degree in international affairs, he was hired by the CIA, where he worked as an analyst, lawyer and head of the legal department.

In 1978 he left Washington and the secret services for a more remunerative (and political) career in Atlanta, first as a lawyer and later as a judge. But he still maintains ties to his old colleagues, so much so that he belongs to the association of ex-CIA officers. He will be the one to reveal one of the most explosive mysteries of the past few years. A mystery in which high finance is intertwined with nuclear technology, and an unknown banker becomes the instrument (in part wittingly and in part not) of international political machinations.

While Barr is completing his investigation (and the Italian judiciary is doing the same), the various tiles of a very elaborate mosaic, a kind of organization which for many months furnished Iraq with sophisticated military equipment worth millions of dollars, keep emerging with increasing clarity. The other day, for example, it became known that Washington blocked a consignment to Iraq of sophisticated computerized machines sold by the American company XYZ Options, with letters of guarantee signed by BNL of Atlanta. The American authorities fear that this technology could be used by Baghdad to build its first nuclear weapon. Yesterday other details emerged with the names of other companies involved.

There has been talk of Iraqi nuclear weapons since 1981, when Israeli bombers destroyed the 70 megawatt nuclear reactor at Osirak. "We will never allow the Iraqis to build such weapons," explained Menachem Begin, then prime minister of Israel. Begin (like his successors) has never confirmed nor denied the existence of an Israeli

atomic bomb, even if much evidence exists that there is one, not the last of which is testimony by "repentant" nuclear technician Mordechai Vanunu (currently serving a 16-year sentence in a Jerusalem prison).

During the bloody 8-year war against Iran, no one was very concerned with Iraq's rearming, which for the most part was concentrated on conventional weapons. But since the truce was signed on 8 August of last year, there have been many signs that Iraq's leader Saddam Hussein is seeking to acquire both nuclear weapons (making use of the 14 kilos of enriched uranium "saved" from the bombing of the Osirak plant) and launch vehicles. For the latter, Iraq is relying on the technical developments of the Condor II ballistic missile, which has a range of 900 kilometers and is the product of a joint venture with Argentina and Egypt.

To gain access to these technologies, Iraq no longer counted on the USSR (which had become worried, so much so that the subject became one of the topics at the meeting in February between Soviet Foreign Minister Shevardnadze and Israeli Foreign Minister Arens). Instead, Iraq has turned to Western "free-lance" companies—English, German, Italian, American—recruited separately and capable of providing the required material (in violation of the 1987 accord setting limits on the export of missile technology). This material was assembled in Iraq.

Of course, this involved the coordination of all commissions, to be done discretely, and finding a way to finance the exports to Iraq, which did not have a reputation for timely payments. And so, as is becoming evident from the investigations, an organization with many tentacles was formed which had its financial center in Europe, between London and Paris, its banker in Atlanta, and its client in Baghdad. It had 2 major objectives: to break up the commissions so that they would not attract attention and to set up a parallel BNL bank in Atlanta, which, through bureaucratic laxity and perhaps a certain "permeability," could be managed "autonomously."

It seems almost certain that the coordination of the commissions was handled by Matrix Churchill, a British company controlled by the Iraqi state holding company Technological Development Group (TDG). This company is located in London and is headed by a lawyer named Kadum. The investigators consider important the information, reported in LA REPUBBLICA, according to which Kadum has close ties to both Hussein Kamel (Iraqi president Hussein's son-in-law and minister of industrial and military production) and Chris Drogoul, ex-director of the BNL branch in Atlanta, with whom he had studied in Paris and often met in London.

For the time being, neither BNL nor the investigators are willing to name the other companies which have exported to Iraq. "It is not our custom to talk about our clients," an Italian bank manager explains, as if all this was an ordinary administrative matter. Gradually, however, the plot is being revealed. Yesterday it was learned

that the Wiltron Company of Morgan Hill, California, sold electronic measuring instruments to its German affiliate. These instruments were subsequently transferred to Messerschmidt-Boelkow-Blohm (MBB) which itself later exported them to Iraq. "We have used BNL to finance our exports several times," says Lind Amaya, a manager of the California company.

The sales of the computerized machines furnished by XYZ of Tuscaloosa, Alabama, (which is currently blocked) were also processed through the BNL in Atlanta. As were sales of Lummus Crest, a New Jersey engineering firm specializing in chemical plants and plastic materials factories. The firm, whose president is Steve Salomon, is part of Combustion Engineering, Inc. In theory, Lummus only helped the Iraqis to design a petrochemical plant south of Baghdad for the production of ethylene. But it would seem that Lummus indirectly furnished to Iraq the technology necessary to obtain special anti-radar materials to be used in the warheads of ballistic missiles.

FEDERAL REPUBLIC OF GERMANY

Technicians Said Helping Libya Develop Missile

Technology Transfer Reported

LD0910174989 London THE SUNDAY
CORRESPONDENT
in English 8 Oct 89 p 1

[By David Blundy and Gideon Rachman in Washington and Alan Philps and Michael Farr in Bonn]

[Text] West German technicians are helping Mu'ammarr al-Qadhafi to develop a ballistic missile that would greatly enhance Libya's offensive capability.

United States intelligence sources say the missile will have a range of 300-450 miles, bringing within Al-Qadhafi's range targets throughout North Africa, including much of Chad and Egypt. The missile would also enable him to strike Mediterranean targets, such as Nato's Sicilian air base.

According to a U.S. military source, about 100 German engineers are in a "desert camp" about 60 miles from the Saharan oasis of Sabha.

The missile project, codenamed Ittisalt, according to the sources, is said to be at the research and development stage. Apart from conventional warheads, the missiles could carry chemical weapons—which Col al-Qadhafi is reported to be developing.

Al-Qadhafi had West German help in setting up a nerve gas plant at Rabtah, and has long been seeking ways to project his military power further afield.

In Munich, the chief public prosecutor, Friedrich Bethke, confirmed on Friday [6 October] that he was

investigating whether any West German companies were involved in a Libyan missile project.

Mr Bethke told The Sunday Correspondent that several West German firms "both big and small" were being investigated. He refused to name the companies, saying the investigation was sub-judice, but added: "So far, we have no concrete results. We still have to decide whether this will lead to legal proceedings."

The prosecutor provided the first confirmation in West Germany of a possible connection to the Libyan missile project. Mr Bethke said the investigation was based on a tip from Munich customs this year.

In its efforts to complete the project, according to the U.S. sources, Libya has also tried to buy German components for the guidance system of the old U.S. Nike-Hercules surface-to-air missile with a view to installing them in its own new rocket.

Exposure of the West German connection in the Libyan missile project will further embarrass Bonn, where Chancellor Helmut Kohl is already resisting pressure from the U.S. Congress for sanctions against West German companies over their lamentable record in exporting sensitive technology to the Third World. He is also under fire for West Germany's inept handling of the Lockerbie disaster investigation.

The Americans are particularly sensitive about West Germany's connections with Libya. Washington and Bonn had a public row this year over the role of a West German firm, Imhausen-Chemie, in building the Rabtah chemical plant. Bonn denied there was anything suspect about the deal but was later forced to admit its own intelligence service had been aware of the project.

America is also alarmed by other indications of West German help for Libya. A West German engineer recently murdered in Tripoli was believed to have been working to set up an in-flight refuelling capacity for the Libyan air force.

Despite the Munich investigation, Washington is likely to treat with great scepticism Bonn's protestations that it is clamping down on the leaks.

Richard Perle, Under Secretary of State for Defence in the Reagan administration, said last week: "It is German government policy to interfere to the absolute minimum with their firms' exports, and then only under great pressure and with extreme reluctance."

With Washington and Moscow set on reducing their nuclear missile and chemical weapons stocks, defence experts believe efforts to stop Third World countries getting hold of these arms will become an urgent item on the arms control agenda. Vice-President Dan Quayle called last week for all members of the European Community to join the 1987 Missile Technology control Regime to stop leaks.

A missile with a range of 450 miles would more than double Libya's capability. Col al-Qadhafi's goal is believed to be the development of a missile with a range of 1,000 miles—allowing him to threaten Israel. The prospect is also known to concern Italy.

A German company called Otrag worked on a Libyan missile in 1979-80. Otrag withdrew from Libya in 1981 after one tentative test-firing. But the head of the company, Lutz Kayser, continued to work for the Libyans until a falling-out with them in the mid-80s.

No Official Information

LD0910180489 Hamburg DPA in German 1651 GMT
9 Oct 89

[Excerpt] Bonn/Munich (DPA)—On Monday neither the FRG Government nor the Munich State Prosecutor's Office were able to confirm a report in the British newspaper THE SUNDAY CORRESPONDENT that Federal German technicians are developing missiles with a range of 450 to 700 kilometers in Libya. Deputy government spokesman Dieter Vogel said that the federal government has no information, not even any from intelligence sources on this.

The Munich state prosecutor quoted in the article, Friedrich Bethke, also said in response to questions that he cannot confirm the information about German technicians in Libya. This does not come under the investigative competence of the Munich State Prosecutor's Office. An investigation he led into the export of missile parts by a firm in the Munich area was closed at the end of August. [passage omitted]

Charges Upcoming on Technology Smuggling

AU2309161489 Hamburg BILD in German
23 Sep 89 pp 1, 9

[Unattributed report: "German Atomic Bomb for Pakistan; Plans and Material Smuggled Out of the Country"]

[Text] Bonn—German scientists have supplied Pakistan with the technology for building the nuclear bomb. They smuggled construction plans and materials worth DM20 million out of the country to enable Pakistan to build a plant to produce tritium, one of the most important elements for nuclear warheads. As BILD was told by the Bundestag committee investigating the Hanau nuclear scandal, the public prosecutor will "shortly" bring charges against the scientists involved. The public prosecutor is convinced that the technology was clearly intended for the construction of weapons.

The senior public prosecutor from Hanau, Albert Farwick, has accused the former manager of Neue Technologien GmbH (NTG) [New Technologies Company] in Gelnhausen, Rudolf O., his colleague Peter F., and the nuclear physicist Heinrich W. from the Max-Planck Institute in Garching of having supplied Pakistan with nuclear technology.

According to findings of investigators and the U.S. intelligence service, this is "only the tip of the iceberg." More German scientists are believed to have participated in the lucrative deal. Top secret blueprints and material have allegedly also been sent to South Africa and India.

The Public Prosecutor's Office in Hanau has meanwhile instituted investigations against two employees of the Darmstadt Society for Heavy Ion Research, 90 percent of which belong to the government and 10 percent to the Land of Hesse. Even scientists of the state-owned nuclear research plants in Karlsruhe and Juelich have come under suspicion. The nuclear scientists are believed to have sold their knowledge through private consulting offices.

According to intelligence reports, the former NTG head Rudolf O. has allegedly bribed scientists in the United States to gain access to top secret military technology. He is believed to have delivered about 50 blueprints to Pakistan, including plans for a laser system for the construction of fuel elements.

Opposition Party Demands End to Cooperation With Brazil

51003034 Munich SUEDEDEUTSCHE ZEITUNG in German 28 Sep p 7

[Article: "Terminate Nuclear Treaty With Brazil"]

[Text] Bonn—With an almost unanimous vote, the SPD [Social Democratic Party of Germany] parliamentary party has decided to use a resolution to call upon the FRG government to terminate the German-Brazilian Nuclear Agreement on 18 November, the date specified in the agreement for such action. Deputy Hermann Bachmeier said on Wednesday [27 September] in Bonn that it has been determined in the "Atomic Scandal/Transnuklear" parliamentary investigation committee that, in addition to a program which is based on the treaty with the FRG about the peaceful use of nuclear energy, Brazil has an "unmonitored parallel program," which "clearly serves military purposes." After the merging of the 2 programs at the end of last year, there is, according to Bachmeier, the danger "nuclear products and technologies supplied by German companies will be used for the production of nuclear weapons."

Bachmeier states that there are already a number of German trained nuclear scientists working in Brazil's military sector. The SPD deputy believes that further cooperation with Brazil, which still refuses to sign the Nuclear Non-Proliferation Treaty, "can no longer be justified."

The German-Brazilian treaty of 1975 specified a duration of 15 years, after which time the cooperation could be critically evaluated. The appointed time has now arrived. If the FRG government does not act by 18 November, then the treaty will in 1990 be automatically extended by 5 years.

As Bachmeier has said, the economic hopes which were placed in this treaty have been disappointed. "The security objections of the critics of the signing of the treaty have meanwhile been confirmed." According to Bachmeier, the government coalition is obviously trying to buy time by setting up commissions and working groups. The SPD deputy sees this as a "delaying action" and declares: "We will not permit the government to avoid a clear decision until 18 November and thus evade its responsibility." The dangers of nuclear weapons proliferation must not be "ignored." Bachmeier demanded: "Nuclear cooperation with Brazil and other threshold countries which have not signed the Nuclear Non-Proliferation Treaty must be ended."

Agreement on Joint Nuclear Research With USSR

LD2109173189 Hamburg DPA in German 1119 GMT 21 Sep 89

[Text] Karlsruhe (DPA)—The Karlsruhe Nuclear Research Center (KfK) and the Moscow Kurchatov Atomic Energy Institute have agreed on several joint research projects. The KfK said today that in 1990 Soviet scientists will take part in a project by the Nuclear Research Center. The two sides intend to look at Soviet filters that are supposed to collect iodine particles and suspended matter in the case of reactor failures. The experts want to carry out tests in a test plant to see what the consequences of a core meltdown are for the reactor foundations' concrete. Moreover, reactor fuel elements manufactured in the USSR are to be researched regarding their behavior during overheating and the effect of the emergency cooling used.

These results emerged from a 3-day working meeting in Karlsruhe on the subject "investigations into serious failures in light water reactors." In 1986 the Federal Republic and the USSR concluded an agreement on scientific and technical cooperation in the peaceful use of nuclear energy.

FRANCE

Government Clarifies Position on Rocket Technology Transfer

Ministry States Policy

51003035 Paris LE QUOTIDIEN DE PARIS in French 7-8 Oct 89 p 14

[Article: "Ariane: France Will Give Its Vikings to Brazil"]

[Text] The French government has issued a number of declarations in reaction to the statements of American officials accusing it of risking the promotion of the transfer of space technologies which could lead to the construction of military missiles by Brazil, and possibly by Libya. This is allegedly for the sake of negotiations currently in progress with Brazil.

In the words of the Ministry of Research and Technology, France wishes to state:

"1. that the French government has authorized Arianespace to continue its negotiations with Brazil about launching future Brasilsat-2 telecommunications satellites with Ariane rockets;

"2. that the final agreement will be subject to the approval of the government, and that this agreement has not yet been finalized;

"3. that the agreement will have to take into account a certain number of established practices and restrictions in the area of technology transfer. The French and the Americans follow the same mutually agreed upon rules with regard to these practices and restrictions".

Informed sources in industry acknowledge that the transfer of the technology of the Viking engine, which is used in the first stages of the European Ariane rockets, indeed plays a role in the proposals to launch Brasilsat-2 satellites. They also note that this type of engine was already sold to India a decade ago.

It is also pointed out that similar accusations were also raised in the United States on 17 July and that both Arianespace, which sells Ariane services, and the European Propulsion Company (SEP), which manufactures the Viking engines, have already responded to these charges.

LE MONDE Comments

51003035 Paris LE MONDE in French 7 Oct 89 p 14

[Article by J.-P. D.: "French Clarification on the Transfer of Space Technology to Brazil"]

[Text] New American protests have caused the French government to publish a statement on a possible transfer of space technology to Brazil. This transfer would involve the "Viking" engine, which is used in the first 2 stages of the Ariane rocket. The Brazilians would like to see this as a part of the contract—currently being negotiated—for launching their communications satellites. Getting this contract would represent a victory for Arianespace over its American rival, McDonnell Douglas, which is offering the services of its Delta rocket.

The Viking engine was already sold to India a decade ago. The Americans, however, believe that this clause would be contrary to the agreements signed by the Western nations to limit the spread of space technologies which could be applied to missiles. Washington points out that Brazil is negotiating about the sale of its domestically produced missiles with Libya.

Arianespace is authorized "to continue its negotiations with Brazil about launching future Brasilsat-2 telecommunications satellites with Ariane rockets." However, the Ministry of Research specified in a communique published on Thursday, 5 October, that "the final agreement will be subject to the approval of the government,"

and that this agreement "which has not yet been finalized," will have to take into account "a certain number of established practices and restrictions in the area of technology transfer. The French and the Americans follow the same mutually agreed upon rules with regard to these practices and restrictions".

This position was already stated last July. (See LE MONDE of 19 July.) But the controversy was revived following "revelations" in the American press according to which Mr Mitterand had personally given his approval to the signing of the contract subject to guarantees of "peaceful" use of the engines. The information came from anonymous American officials and ... the managers of McDonnell Douglas.

GREECE

Briton Arrested Delivering Radioactive Substances

Athens Radio Report

NC1110230589 Athens Domestic Service
in Greek 1930 GMT 11 Oct 89

[Text] The Athens prosecutor at the court of first instance has brought charges concerning the transporting of radioactive substances against Briton Derek Smith, aged 41. Smith was arrested this morning while he was delivering 2 and 1/2 kg of uranium to the director of the Dhimokritos Institute for examination. The accused will make a statement tomorrow; until then he will remain in detention.

Uranium 'Destined for Libya'

NC1210185289 Athens ATHENS NEWS in English 12 Oct 89 p 3

[Text] A Britisher was arrested yesterday and charged with illegally possessing 2.5 kilograms (5.5 pounds) of pure uranium he claimed was a sample destined for Libya.

Police identified him as Derek Smith, 41, of Britain who lives temporarily near Preveza, on Greece's west coast.

Smith told police that the uranium, type 238, was a sample from 250 kilograms (550 pounds) sitting in South Africa and offered by a South African friend at 180,000 US\$ per kilogram. He said his South African source also had several kilograms of uranium type 235 for sale.

Uranium, a radioactive metallic chemical element, is important in work concerning atomic energy.

A police official, who asked not to be named, said that Smith told investigators that the uranium was delivered to him at an Athens hotel earlier this year by a messenger said to be from South Africa.

The unidentified South African was said to be representing Malcolm Forbes, also of South Africa, who Smith said was an old friend.

Smith told police that Forbes, in phone conversations, asked him to visit Libya with the samples to see whether he could put a deal together with Libyan officials for the sale of the 250 kilograms of uranium.

Unsure of what the two small packages contained, Smith told police that he went to the British Embassy who turned him away saying they were not the competent authority to conduct a test of the contents.

He next went to the U.S. Embassy where he said an employee took a small sample of the package's contents for testing purposes. Smith said that he returned a week later to be told that it was not uranium.

Unconvinced about the U.S. Embassy's claim, Smith took the packages yesterday to Ioannis Papazoglou, director of the Dhimokritos Atomic Energy Research Center, where a test confirmed the contents were pure uranium. Papazoglou then summoned police who arrested the Briton.

The police official was unable to shed further light on the case. He said investigating magistrate Konstandinos Panaritis gave Smith until Monday to prepare his defense.

IRELAND

UK-FRG Uranium Processing Agreement Protested

51500191 Dublin IRISH INDEPENDENT in English
28 Jul 89 p 11

[Article by Liam Ryan]

[Text] The Government has moved at diplomatic level to protest strongly over a deal between Britain and West Germany for re-processing huge quantities of uranium at the infamous Sellafield nuclear plant.

Irish embassies in London and Bonn have been instructed to lodge official objections in the toughest terms with the two governments following the signing of the controversial agreement on Tuesday.

The Irish diplomats in the two capitals have also been told by Dublin to demand the full details and implications of the deal.

Under the agreement, signed in Bonn by British Energy Minister Michael Spicer, Britain has undertaken to reprocess spent uranium and plutonium—produced by civil nuclear plants—for re-export to Germany.

The deal will mean that as much as 4,000 tonnes of uranium could be shipped for reprocessing by British Nuclear Fuels over the next few years in contracts worth a massive 1.6£ billion sterling to the British.

But after details of the deal became known Energy Minister Bobby Molloy expressed alarm at the arrangement and last night declared he was making formal objection to the British-German deal within the next day or so.

And Green Party TD Roger Garland warned yesterday that the agreement indicates that the life of the much-troubled Sellafield plant was being extended instead of shortened.

Meanwhile, two Fine Gael TDs have claimed that Britain is "toying" with plans to store high-risk nuclear waste in caverns under the Irish Sea.

Environment and Energy spokesmen Alan Shatter and Richard Bruton have lodged an official objection over the proposed development works at Wylfa nuclear power station in Wales because they are highly concerned that this would lead to increased risks of exposure to radiation for the many thousands of people living along the east coast—from Wexford to Antrim.

Campaign Against Sellafield Boosted by Cancer Rise

51500192 Dublin IRISH INDEPENDENT in English
29 Jul 89 p 13

[Article by Bernard Purcell and Don Lavery]

[Text] Shock figures, which show a "cancer cluster" affecting young children and young adults around the Hinkley Point nuclear power station in Britain, strengthen Irish objection to the building of a new station at the site.

The research, published in the British Medical Journal, shows that the number of cases of leukaemia and malignant lymphomas in children and young adults has risen to nearly double the national average since nuclear operations were commissioned in 1964 and expanded in 1977.

It shows that between 1964, when the first station was built, and 1986 only 10.4 cases of rare types of cancer would have been expected in children and young adults in Somerset if the national trend were followed. There were 19 cases.

But the rate of rare cancers in children from as young as one-year-old and adults up to 24 was up to four times higher than the national average within 12.5 kilometres of the station.

The research was carried out by consultant haematologists at Somerset Health Authority. They admit they cannot be certain whether the cancers were caused by radiation or a virus introduced during the influx of people to the area of the new station.

London-based consultant John Large, who has objected to the plant and one proposed at Wylfa in Wales on behalf of various Irish local authorities including Dublin Corporation and Co. Council, Wexford Co. Council and

Dundalk UDC, said: "It's acknowledged now that there is a risk of leukaemia among people living around these plants."

All the medical evidence was that radiation caused cancers, but "until someone can positively prove it without a doubt that this is what happened here, the nuclear industry will continue to deny it."

Dublin Corporation is one of the groups which have objected at a public inquiry to the building of a new station at the Somerset site at a public inquiry.

The latest medical evidence should help that case, said Councillor Eoin Ryan (FF), who has played a leading role in opposing new nuclear stations in the UK.

A public inquiry into the building of a third station at Hinkley Point is at the summing-up stage.

The inquiry inspector, Michael Barnes QC, who has recently returned from a trip to the USSR to see the affects of the Chernobyl explosion, allowed Irish objections from local authorities to be taken.

He said there was no early-warning "hot line" system between Britain and Ireland, such as existed between the UK and France, with a support mechanism for alerting local authorities. Instead such communication was based on "goodwill".

A Department of Energy spokeswoman said there was continuing formal contact with the British and the department was informed of any accidents.

UNITED KINGDOM

Trade Union Congress Calls for Nuclear Power End

51500188 London THE DAILY TELEGRAPH in English
8 Sep 89 p 9

[Article by Martin Whitfield]

[Text] Nuclear power should be phased out in the interests of the human race, Mr Arthur Scargill, miners' leader, told Congress yesterday in a speech which brought the first defeat at this year's conference for the General Council. Congress rejected its argument for a "balanced energy policy" and called for an end to nuclear power within 15 years.

Mr Scargill, general secretary of the National Union of Mineworkers, making his first speech at conference after being confined to his hotel room by influenza, said he would be ready to sacrifice miners' jobs if it meant the end of nuclear power.

"If somebody said to me 'we are prepared to close and phase out the nuclear industry but the price is the phasing out of the coal industry,' I would pay it.

"I would pay it because I not only have a vested interest in the coal industry but have a vested interest in the human race," he declared.

Despite opposition from the three biggest unions, Transport Workers, General Municipal and Boilermakers, and Engineering Workers, his motion calling for the end of nuclear power was accepted on a card vote by 4,482,000 to 3,669,000.

He said nuclear power was more expensive and carried the risk of disaster. "How much more convincing do we need in the trade union movement before we stop this insanity?"

The vote is a blow to Mr Kinnock, who favours a balanced energy policy. Labour's policy is for no more investment in nuclear energy but for existing power stations to be used for the rest of their lives.

Mr Ron Todd, general secretary of the TGWU, said he understood the feeling against nuclear power but it was important not to pit energy worker against energy worker. "We recognise that there are high risks in every sector of the energy industry. The industry is only as safe as we make it."

TUC officials tried to put a brave face on the defeat by saying that work on improving safety standards and efforts to secure international agreement on safety would go ahead.

Mr Scargill offered to make a start on a shutdown by sending pickets to a one-day strike next week by workers at British Nuclear Fuels' plants.

His offer was rejected by Mr Phil Kemall, of the Institution of Professionals, Managers and Specialists, which is involved in a pay dispute with British Nuclear Fuels. "We will run the dispute our way," he replied.

The defeat for the General Council was backed by the big public service unions, Nalgo and Nupe, the Left-wing Manufacturing, Science and Finance Union and smaller unions.

Mr Gavin Laird, general secretary of the engineering union and a firm supporter of nuclear energy, said the TUC had to protect jobs in power supply. The balance of about 20 per cent of electricity supply from nuclear plants was "about right".

The argument that jobs were all-important was rejected by Mr Vic Heath, of the building workers' union, UCATT. He said unions should be talking about the future of the human race, not membership in power stations.

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